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Review of the Chinese species of *Ichthyurus* (Coleoptera, Cantharidae)

Wenwen Zhang[1*], Hanqing Lin[1*], Haoyu Liu[1,2], Xingke Yang[3], Yuxia Yang[1,2]

1 *Key Laboratory of Zoological Systematics and Application, School of Life Science, Institute of Life Science and Green Development, Hebei University, Baoding 071002, Hebei Province, China*

2 *Hebei Basic Science Center for Biotic Interaction, Hebei University, Baoding 071002, China*

3 *Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China*

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Corresponding author: Yuxia Yang (yxyang@hbu.edu.cn)

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Abstract

The genus *Ichthyurus* Westwood, 1848 from China's mainland is comprehensively reviewed. Four new species are described, including *I. cleriformis* **sp. nov.** (China: Yunnan; Laos: Vientiane, Champasak), *I. simplus* **sp. nov.** (China: Guangxi), *I. senensomimus* **sp. nov.** (China: Yunnan) and *I. terminalis* **sp. nov.** (China: Yunnan). Meanwhile, four species are recorded to China for the first time, including *I. platyurus* Gestro, 1906, *I. laniger* Gestro, 1891, *I. bisignatus* Pic, 1926 and *I. phungi* Pic, 1923. Additionally, both *I. senensis* Pic, 1926 and *I. davidi* Gestro, 1892 are re-described in detail within this review process. These species are illustrated with their habitus and genital segments of both sexes, aedeagus and thoracic legs of male, as well as internal genitalia of female. A key for identification of the Chinese *Ichthyurus* species is also provided.

Key Words

Alpha taxonomy, Ichthyurini, morphology, Oriental Region, soldier beetles

Introduction

Ichthyurus Westwood, 1848 is the largest genus within the tribe Ichthyurini of the beetle family Cantharidae, comprising approximately 200 species worldwide (Delkeskamp 1977; Brancucci 1983, 2009; Li et al. 2014; Li and Gao 2015; Lin et al. 2024a, b, 2025). This genus exhibits a broad distribution across the Southern Hemisphere, with the exception of the Australian Region (Delkeskamp 1977). The majority of its species (accounting for approximately 80%) are restricted to the Oriental Region (Delkeskamp 1977). However, there have been only a few studies focusing on specific faunas, such as Nepal (Brancucci 2009) and Taiwan Island (Brancucci 1983). Prior to our studies (Lin et al. 2024a, b, 2025), only six species had been recorded in China's mainland (Delkeskamp 1977). As noted in our previous research (Lin et al. 2024a, b, 2025), the Chinese mainland, recognised as one of the world's renowned biodiversity hotspots, possesses significant potential for the discovery of additional *Ichthyurus* species. Undoubtedly, there exist some common species shared with neighbouring countries (Lin et al. 2024a, 2025), in addition to some endemic species to the Chinese fauna (e.g. Lin et al. (2024b)).

During our recent study, we discovered several interesting species of *Ichthyurus* from China. Through examination and comparisons with types, we have identified them into some previously-known species, as well as a few that are new to science. Given that most species within this genus have not been reviewed for nearly a century, it is essential to re-describe them to enhance their recognition. Furthermore, the original descriptions are usually

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simple and without or with only simple illustrations, so it is crucial to update them according to contemporary standards. Moreover, as more and more species discovered, a comprehensive review the Chinese species are becomes increasingly necessary, along with a key designed to facilitate further research in this area. This study aims to report our findings in order to enrich the understanding of the species diversity within the genus *Ichthyurus*.

Material and methods

The studied material is preserved in the following collections:

IZAS Institute of Zoology, Chinese Academy of Sciences, Beijing, China;
MGI Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy;
MHBU Museum of Hebei University, Baoding, China;
MNHN Muséum national d'Histoire naturelle, Paris, France;
NWAFU Northwest A & F University, Yangling, China.

The specimens were initially softened in water at room temperature for a duration of 12 hours and then the genitalia and genital segments of both sexes were dissected. After dissection, the male genitalia were immersed in a 10% sodium hydroxide (NaOH) solution and subsequently placed in a metal bath heated to 90 °C for one minute. The cleared male genitalia were then examined and photographed in glycerol before being affixed to a paper card for permanent preservation. The female genitalia underwent staining with haematoxylin, followed by examination in 75% alcohol and preserved in glycerol. For each species, at least one specimen was dissected and additional specimens were treated if any damage occurred during the dissection process. In cases where a species is recorded from several localities, each locality was compared using dissections of both female and male specimens.

Images of the habitus were captured using a Canon EOS 80D digital camera, while others were obtained with a Leica M205A stereo-microscope. Multiple layers were stacked using Helicon Focus 7 software. Subsequent image processing and measurements were conducted in Photoshop 2020.

The morphological terminology employed in this study follows the conventions established by Brancucci (1980). The French term "bride tergal" is translated into English as "tergal flange".

Body length was measured from the front of the head to the apices of the postero-lateral projections of the terminal abdominal tergite, while width was assessed at the elytral humeri. The interocular distance was recorded at its minimum between the eyes and eye diameter was measured at its maximum dimension. The length and width of mesofemora were determined at their respective maximum points in the lateral view. The length of the terminal abdominal tergite was gauged from its base to the apices of its postero-lateral projections and width was measured at its maximum extent. Finally, for the terminal abdominal ventrite, length was taken from base to apex and width was recorded at its maximum measurement in ventral view.

Complete label data for type specimens of the previously known species are present, using square brackets "[]" to denote our remarks and comments, [p] indicating that the following data are printed, while [h] that they are handwritten. Quotation marks are used to separate data from different labels and a forward slash "/" to separate data from different lines of the same label. All labels originally written in Chinese have been transliterated into English.

Results

Class Insecta Linnaeus, 1758
Order Coleoptera Linnaeus, 1758
Superfamily Elateroidea Leach, 1815
Family Cantharidae Imhoff, 1856
Subfamily Chauliognathinae LeConte, 1861
Tribe Ichthyurini Champion, 1915
Genus *Ichthyurus* Westwood, 1848

Ichthyurus senensis Pic, 1926

Figs 1A, B, 2, 3A–D, 8A

Ichthyurus senensis Pic, 1926: 5.

Type material examined. ***Holotype*** • 1♀ (MNHN), [h] "yunnan / Chine", [h] "senensis / n. sp.", [p] "HOLOTYPE".

Additional material examined. China, Yunnan • 2♂♂1♀ (MHBU), Puer, Muchang, 17.VII.2021, Tong Liu leg. • 1♂ (MHBU), Dali, Jizu Mountains, 25.VI.2022, Younan Wang leg.

Re-description. Body length (both sexes): 7.7–10.2 mm; body width (both sexes): 1.6–1.7 mm.

Male (Fig. 1A). Colouration. Body black, head yellow before antennal sockets, scape and pedicle yellow ventrally, prosternum yellow, pronotum yellow with a large irregular black marking extending to anterior and posterior margins, scutellum yellow, elytra yellow at humeri and along suture, the yellow stripes paler and wider at basal parts and near apices, legs yellow at basal 1/4 parts of profemora, 1/2 parts of mesofemora and 3/4 parts of metafemora, protibiae yellow at ventro-apical 3/4 parts, abdominal segments narrowly yellow at posterior margins.

Eyes large, interocular distance ca. 0.6 times of the diameter of an eye. Antennae reaching to posterior margin of abdominal tergite II, antennomere II ca. 1/4 length of I, III–XI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.1 times wider than long, anterior margin arcuate, lateral margins feebly diverging posteriorly, posterior margin bisinuate, anterior angles subrounded, posterior angles nearly rectangular.

Elytra 1.5 times longer than wide, ca. 2.6 times longer than pronotum, with lateral margins nearly straight, sutural margins nearly straight and slightly dehiscent from base, distance between sutural margins feebly wider than apical width of an elytron, apices subrounded.

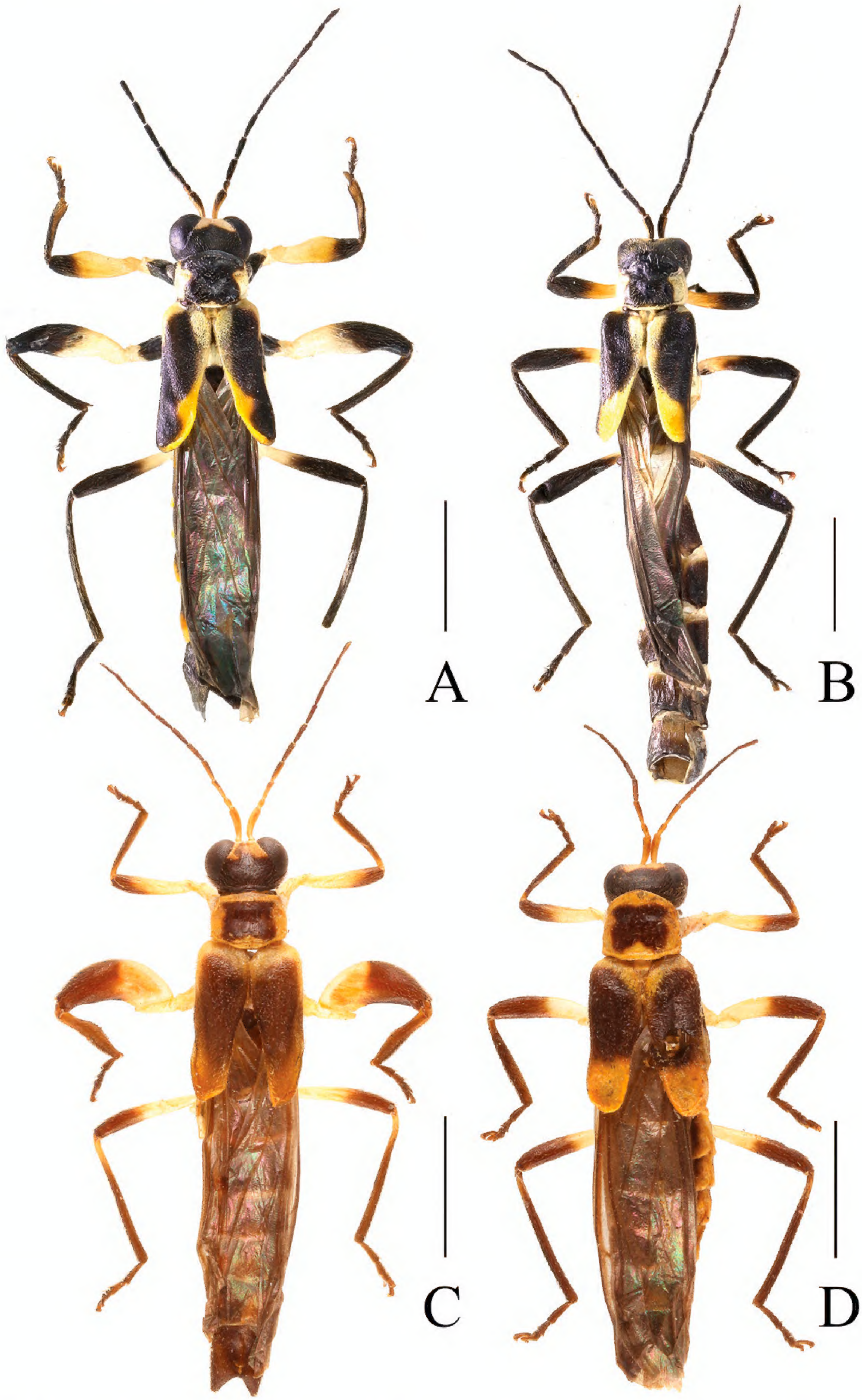

Figure 1. Habitus of *Ichthyurus* species, dorsal view: **A, B.** *I. senensis* Pic, 1926; **C, D.** *I. davidi* Gestro, 1892; **A, C.** males; **B, D.** females. Scale bars: 2.0 mm.

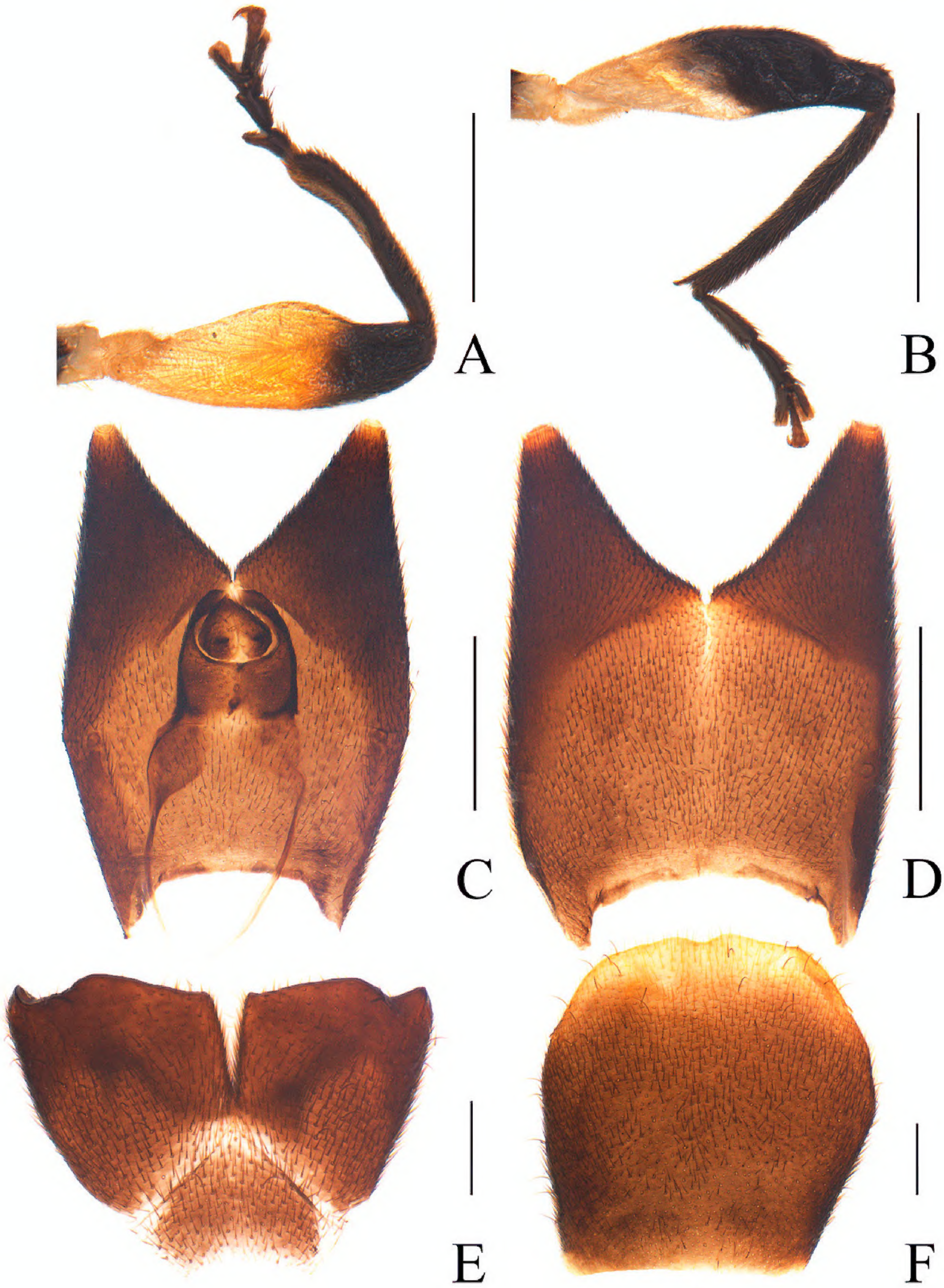

Figure 2. *Ichthyurus senensis* Pic, 1926: **A.** Prothoracic-leg, lateral view; **B.** Mesothoracic-leg, lateral view; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A–C, E.** Males; **D, F.** Females. Scale bars: 0.5 mm (**A–D**); 0.2 mm (**E, F**).

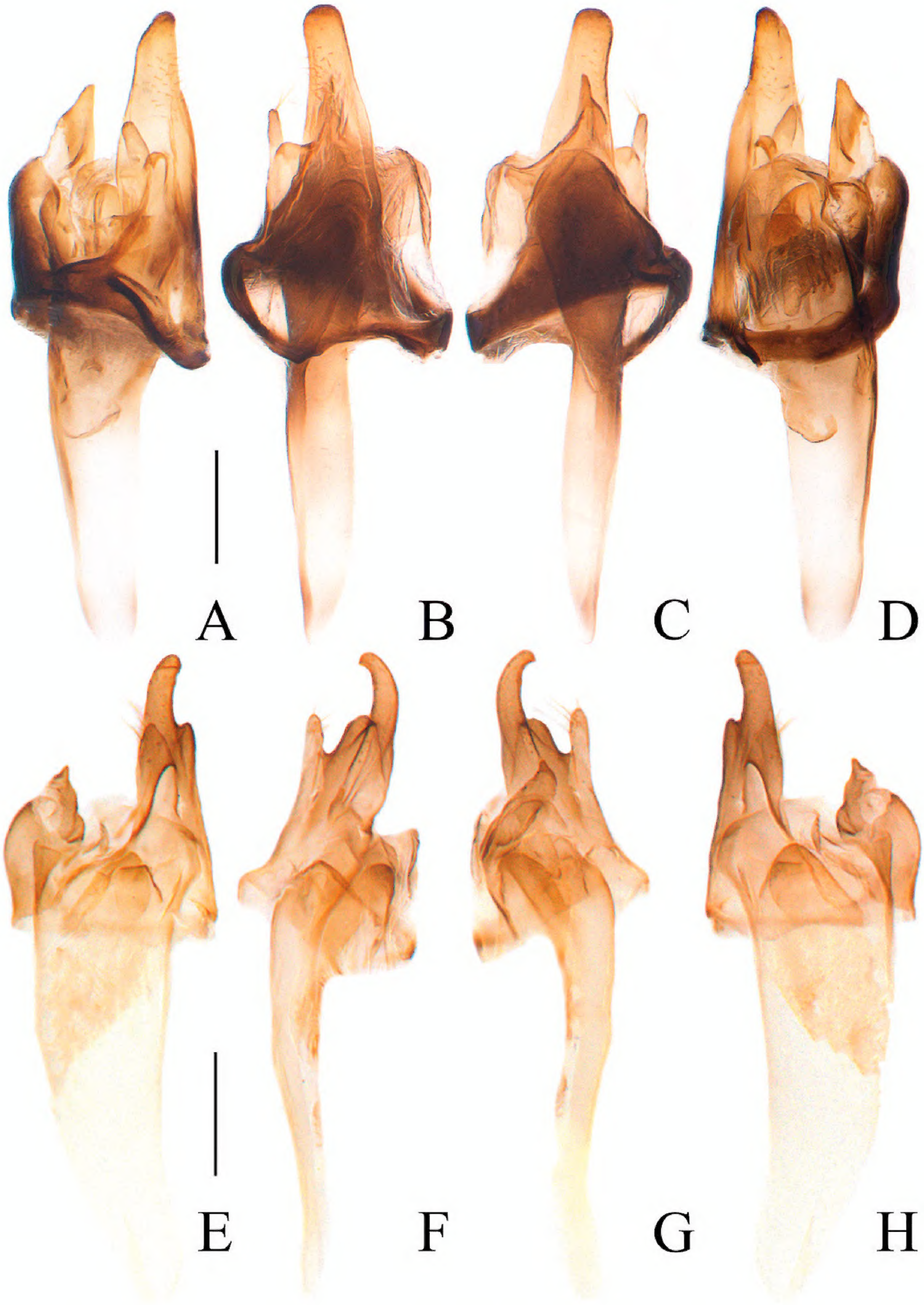

Figure 3. Aedeagi of *Ichthyurus* species: **A–D.** *I. senensis* Pic, 1926; **E–H.** *I. davidi* Gestro, 1892. **A, E.** Dorsal views; **B, F.** Left-lateral views; **C, G.** Right-lateral views; **D, H.** Ventral views. Scale bars: 0.2 mm.

Profemora (Fig. 2A) slightly swollen in middle, protibiae (Fig. 2A) shallowly excavated on inner apical side, protarsomeres I projecting anteriorly and beneath II (Fig. 2A); mesotrochanters (Fig. 2B) without any tooth, mesofemora (Fig. 2B) slightly swollen, 3.5 times longer than wide, mesotibiae (Fig. 2B) each with a spine-like process at apex; meta-thoracic legs slender and simple (Fig. 1A, B).

Terminal abdominal tergite (Fig. 2C) ca. 1.5 times longer than wide, with postero-lateral projections ca. 2/5 length of the tergite, feebly arcuate at inner margins, distinctly arcuate at outer margins. Proctiger (Fig. 2C) peach-shaped and evenly sclerotised, completely surrounded by paraproct; paraproct (Fig. 2C) strongly developed and tubular, feebly shrunk apically, shallowly emarginate in dorso-posterior margin, tergal flange weakly sclerotised, strongly expanded at base and narrowly protruding apically.

Terminal abdominal ventrite (Fig. 2E) trilobed, approximately twice as wide as long, fissured in middle of apical half part, with lateral lobes feebly diverging posteriorly and nearly straight at both inner and outer margins, sinuate at posterior margins, acute at outer apical angles, rectangular at inner apical angles.

Abdominal sternite IX (Fig. 8A) moderately sclerotised and subparallel-sided, ca. 2.4 times longer than wide, with posterior margin obliquely truncate, posterior right angles subrounded and left angles widely triangular, anterior left angle stout beak-shaped and right angle strongly protruding anteriorly, slightly expanded and rounded at apex.

Aedeagus (Fig. 3A–D): right paramere dorso-ventrally flattened, tapered apically, 1.5 times as long as wide; left paramere elongate and conical, nearly straight, approximately twice longer than right paramere, rounded at apex, covered with some short setae on dorsal side (Fig. 3B); setifore extension developed and moderately sclerotised, 1/3 length of left paramere (Fig. 3B, C); median lobe 1.5 times longer than parameres, progressively narrowed basally (Fig. 3A, D).

Female (Fig. 1B). Similar to males, but body larger, scape and pedicle uniformly black, eyes less protruding, legs yellow at basal 1/4 parts of pro- and meso-femora, metafemora uniformly black, protibiae yellow at ventro-apical 1/4 parts, pro- and mesothoracic legs slender and simple; terminal abdominal tergite (Fig. 2D) ca. 1.3 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite; terminal abdominal ventrite (Fig. 2F) nearly as long as wide, widest at apical part, rounded at latero-apical angles, arcuate at lateral margins, feebly emarginate in middle of posterior margin.

Distribution. China (Yunnan).

Ichthyurus davidi Gestro, 1892

Figs 1C–D, 3E–H, 4, 8B

Ichthyurus davidi Gestro, 1892: 1038.

Type material examined. ***Holotype*** • 1♀ (MGI), [h] "Kian-si / A. David / D. oberth", [h] "Davidii / Gestro", [p] "Typus".

Additional material examined. China, Anhui • 2♂♂1♀ (IZAS), Jinzhai, Qingshan, 3–7.VI.2009, Zhishu Xiao leg. Fujian • 1♂ (IZAS), Chongan, Xingcun, 900–1000 m alt., 7.VII.1960, Yiran Zhang leg. • 2♂♂ (IZAS), Chongan, Xingcun, Guadun, 950–1210 m alt., 12.VI.1960, Yong Zuo leg. • 1♂ (IZAS), Chongan, Xingcun, Guadun, 1000–1200 m alt., 2.VI.1960, Shengqiao Jiang leg. • 1♂1♀ (IZAS), Wuyishan, Tongmu, Qiliqiao, 818 m alt., 23.V.2018, Yuanyuan Lu & Yandong Chen leg. • 1♂ (MHBU), Wuyishan, 5. VII. 2003, Ming Bai & Guodong Ren leg. • 1♂ (IZAS), "Guihe Vill Meihua Mt. Fujian Prov. alt. 1200 m, 4-VI-2007, HUANG & XU leg." • 1♀ (IZAS), Chongan, Xingcun, Guadun, 1140 m alt., 2.VII.1960, Fuji Pu leg. • 1♀ (IZAS), Chongan, Xingcun, Sangang, 740–900 m alt., 7.VII.1960, Yiran Zhang leg. • 1♀ (IZAS), Jianyang, Huangkeng, 900–1170 m alt., 5.VII.1960, Fuji Pu leg. Guangxi • 1♂1♀ (IZAS), Longsheng, Huaping, 1420 m alt., 20.VI.1963, Chunguang Wang leg. • 1♂ (IZAS), Longsheng, Huaping, 1420 m alt., 22.VI.1963, Shuyong Wang leg. • 1♂1♀ (IZAS), Longsheng, Neicujiang, 840 m alt., 6–7.VI.1963, Shuyong Wang leg. • 1♂ (IZAS), Longsheng, Hongtan, 900 m alt., 14.VI.1963, Shuyong Wang leg. • 1♂ (IZAS), Longsheng, Hongmaochong, 900 m alt., 10.VI.1963, Chunguang Wang leg. • 2♀♀ (IZAS), Longsheng, Baiyan, 1150 m alt., 19–20.VI.1963, Shuyong Wang leg. Guangdong • 4♂♂ (MHBU), Nanling, 20-V-2021, Younan Wang leg.

Re-description. Body length (both sexes): 7.4–8.0 mm; body width (both sexes): 1.5–1.6 mm.

Male (Fig. 1C). Colouration. Body black, head yellow before antennal sockets, antennomeres I–III yellow, prosternum yellow, pronotum yellow with a large nearly square black marking in middle of disc, scutellum yellow, elytra yellow around bases including humeri and at apices, legs yellow at trochanters and basal 1/3 parts of profemora, 1/2 parts of mesofemora and 2/3 parts of metafemora, abdomen yellow posteriorly and laterally.

Eyes large, interocular distance approximately half of the diameter of an eye. Antennae reaching elytral apex, antennomere II ca. 1/4 length of I, III–XI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.2 times as wide as long, anterior margin arcuate, lateral margins parallel, posterior margin bisinuate, anterior angles truncate, posterior angles nearly rectangular.

Elytra 1.5 times longer than wide, ca. 2.3 times longer than pronotum, with lateral margins nearly straight, sutural margins nearly straight and slightly dehiscent from the basal 1/4 part, distance between sutural margins as wide as apical width of an elytron, apices rounded.

Pro- and meta-thoracic legs slender and simple (Fig. 1C); mesotrochanter (Fig. 4A) projecting, with an obtuse apical tooth, mesofemora (Fig. 4A) strongly swollen, 2.5 times longer than wide, without any tooth ventrally, mesotibiae (Fig. 4A) slightly dilated in middle, each with a finger-like process at apex.

Terminal abdominal tergite (Fig. 4C) ca. 1.5 times longer than wide, with postero-lateral projections ca. 1/4 length of the tergite, feebly arcuate at inner margins,

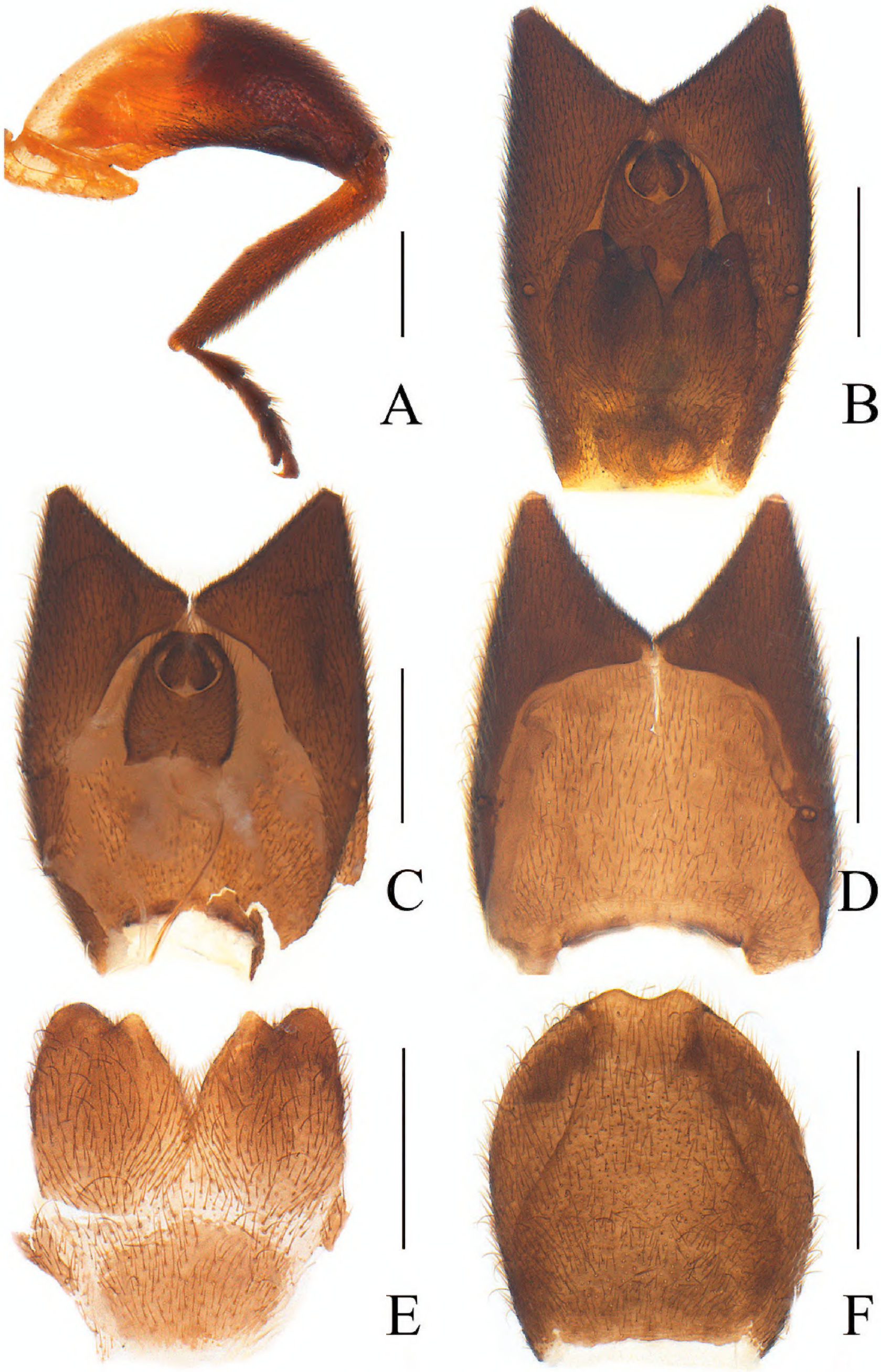

Figure 4. *Ichthyurus davidi* Gestro, 1892: **A.** Mesothoracic-legs, lateral view; **B.** Genital segments in natural state, ventral view; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A–C, E.** Males; **D, F.** Females. Scale bars: 0.5 mm (**A–D**); 0.2 mm (**E, F**).

moderately arcuate at outer margins. Proctiger (Fig. 4C) peach-shaped and evenly sclerotised, surrounded by paraproct; paraproct (Fig. 4C) strongly developed and tubular, feebly shrunk apically, nearly straight at dorso-posterior margin, tergal flange (destroyed and missing).

Terminal abdominal ventrite (Fig. 4E) trilobed, nearly as long as wide, fissured in middle of apical 1/3 part, with lateral lobes nearly straight and diverging posteriorly at inner margins, arcuate at outer margins, rounded at outer apical angles, acute at inner apical angles, triangularly emarginate at posterior margins.

Abdominal sternite IX (Fig. 8B) moderately sclerotised and subparallel-sided, approximately twice longer than wide, with posterior margin obliquely truncate, posterior right angles rectangular and left angles widely rounded, anterior left angle small beak-shaped and right angle strongly protruding anteriorly, slightly expanded and rounded at apex.

Aedeagus (Fig. 3E–H): right paramere short and snail-shaped, acute at apex, as long as wide (Fig. 3E, H); left paramere largely hooked at apex (Fig. 3F, G), almost vertically stepped near apical 1/3 part of outer side (Fig. 3E, H), ca. 3.0 times longer than right paramere; setifore extension developed and moderately sclerotised, ca. 1/3 length of left paramere (Fig. 3F, G); median lobe ca. 1.5 times longer than tegmen, progressively narrowed basally (Fig. 3E, H).

Female (Fig. 1D). Similar to males, but body larger, eyes less protruding, legs yellow at basal 1/2 parts of pro- and metafemora, mesothoracic legs slender and simple; terminal abdominal tergite (Fig. 4D) ca. 1.3 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite; terminal abdominal ventrite (Fig. 4F) nearly as long as wide, widest near middle, rounded at lateral margins and confluent with outer apical angles, shallowly and roundly emarginate in middle of posterior margin.

Distribution. China (Jiangxi, Anhui, Fujian, Guangxi, Guangdong).

Ichthyurus platyurus Gestro, 1906

Figs 5A, B, 6A, 7, 8C, 9A–D, 10A

Ichthyurus platyurus Gestro, 1906b: 295, figs 18–20.

Type material examined. ***Holotype*** • 1♀ (MGI), [h] "Momeit / Doherty / Mus. Br. 1906", [h] "platyurus / Gestro", [h] "platyurus / Gestro / typus / 8320", [p] "Typus", [p] "♀".

Additional material examined. China. Yunnan • 3♀♀ (IZAS), Xishuangbanna, Menga, 800 m alt., 1.VI.1958, Shuyong Wang leg. • 1♀ (IZAS), same locality as the preceding, 1050–1080 m alt., 4.VIII.1958, Shuyong Wang leg. • 2♀♀ (IZAS), same locality as the preceding, 800 m alt., 1.X.1958, Zhizi Chen leg. • 1♀ (IZAS), Xishuangbanna, Menghun, 750 m alt., 3.VI.1958, Zhizi Chen leg. • 1♀ (IZAS), same locality as the preceding, 1200 m alt., 11.V.1958, Yiran Zhang leg. • 1♂2♀♀ (NWAFU), Mengyang, 800 m alt., 6.VI.1991, Yinglun Wang & Ruigang Tian leg.

Re-description. Body length (both sexes): 9.4–9.9 mm; body width (both sexes): 1.4–1.6 mm.

Male (Fig. 5A). Colouration. Body yellow, head with a black transverse marking on vertex, antennae black, except for yellow antennomeres I–III; pronotum with a median transverse black band; elytra with a pair of longitudinal black stripes along lateral margins, except for humeri; leg black at apical 1/3 parts of pro- and mesofemora, and 1/5 parts of metafemora, as well as all tibiae and tarsi; abdomen black ventrally and laterally, terminal abdominal tergite with postero-lateral projections black along basal parts of outer margins, whole length of inner margins and apices, as well as a pair of black bar-like markings at basal parts of dorsal sides.

Eyes strongly protruding, interocular distance ca. 0.7 times of the diameter of an eye. Antennae extending to elytral apices, antennomere II ca. 1/4 length of I, III–XI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.1 times wider than long, anterior margin rounded, lateral margins diverging posteriorly, posterior margin bisinuate, anterior angles confluent with anterior and lateral margins, posterior angles nearly rectangular.

Elytra 1.7 times longer than wide, ca. 2.9 times longer than pronotum, with lateral margins near straight, sutural margins distinctly sinuate and strongly dehiscent from the basal 1/3 part, distance between sutural margins twice as wide as apical width of an elytron, apices rounded.

Pro- and meta-thoracic legs slender and simple (Fig. 5A, B); mesotrochanters (Fig. 6A) projecting, each with a cylindrical apical tooth; mesofemora (Fig. 6A) strongly swollen, twice longer than wide, each with a large and sharp tooth in middle of ventral side, excavated at ventro-apical half part, where covered with very short and stout setae on surface, mesotibiae (Fig. 6A) longitudinally ridged laterally, each with a shape tooth in middle, which opposite to the femoral tooth, mesotarsomere I lengthened and ca. 3.0 times longer than II.

Terminal abdominal tergite (Fig. 7A, C) ca. 4.0 times longer than wide, with postero-lateral projections dorso-ventrally flattened, ca. 5/7 length of the tergite, nearly straight at both inner and outer margins, feebly protruding posteriorly at apex (Fig. 7C). Proctiger (Fig. 7C) peach-shaped and sclerotised laterally, completely surrounded by paraproct; paraproct (Fig. 7C) moderately developed and tubular, feebly shrunk apically, shallowly emarginate in middle of dorso-posterior margin, tergal flange weakly sclerotised.

Terminal abdominal ventrite (Fig. 7E) trilobed, nearly as long as wide, fissured in middle of apical half part, with lateral lobes nearly straight and moderately diverging posteriorly at inner margins, feebly arcuate at outer margins, widely rectangular at inner apical angles, rounded at outer apical angles, sinuate at posterior margins.

Abdominal sternite IX (Fig. 8C) weakly sclerotised and narrowed posteriorly, ca. 2.6 times longer than wide, with posterior margin rounded, posterior right and left angles rounded, anterior left angle small beak-shaped and right angle strongly protruding anteriorly, moderately expanded and rounded at apex.

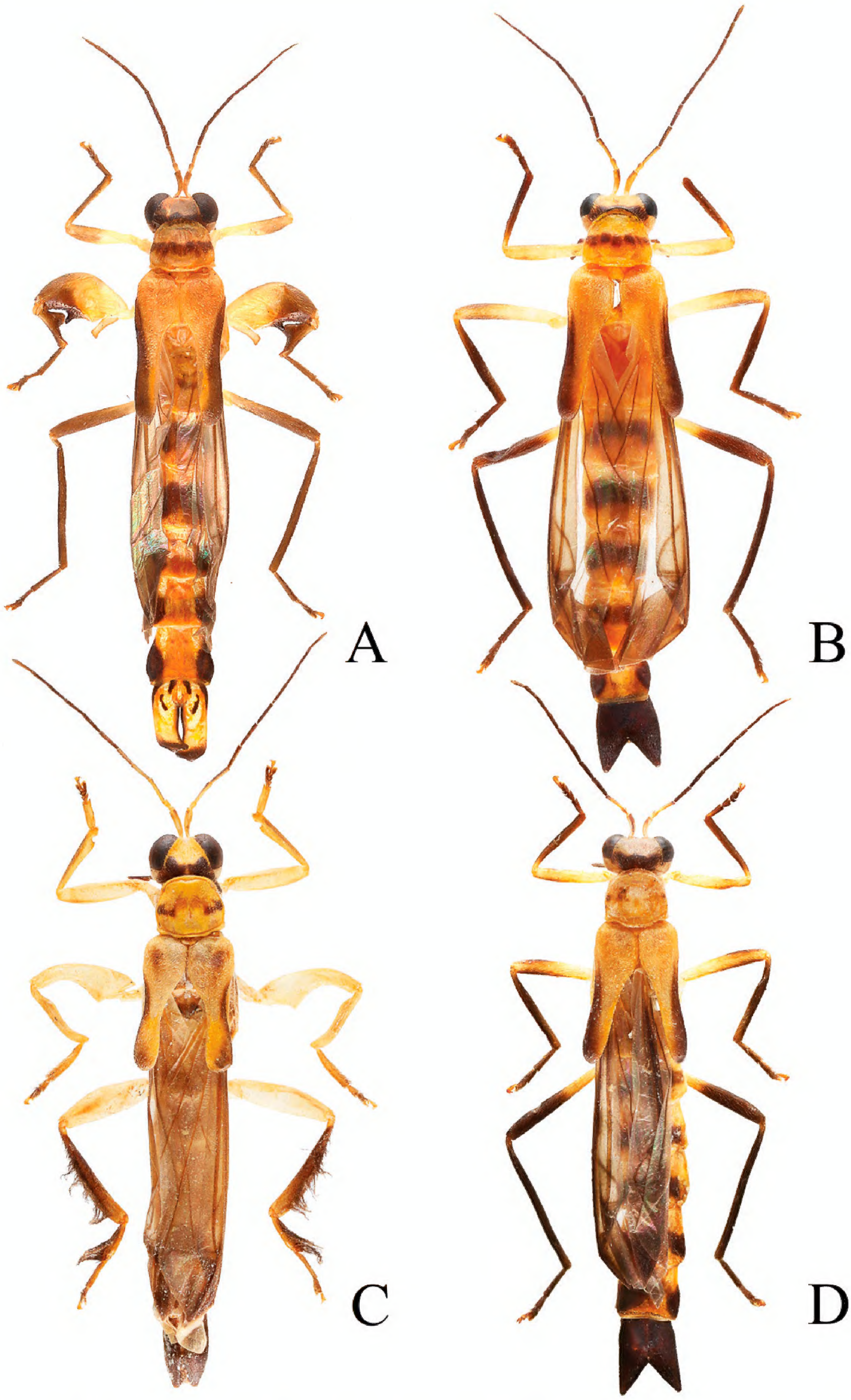

Figure 5. Habitus of *Ichthyurus* species, dorsal view: **A, B.** *I. platyurus* Gestro, 1906; **C, D.** *I. laniger* Gestro, 1891; **A, C.** Males; **B, D.** Females. Scale bars: 2.0 mm.

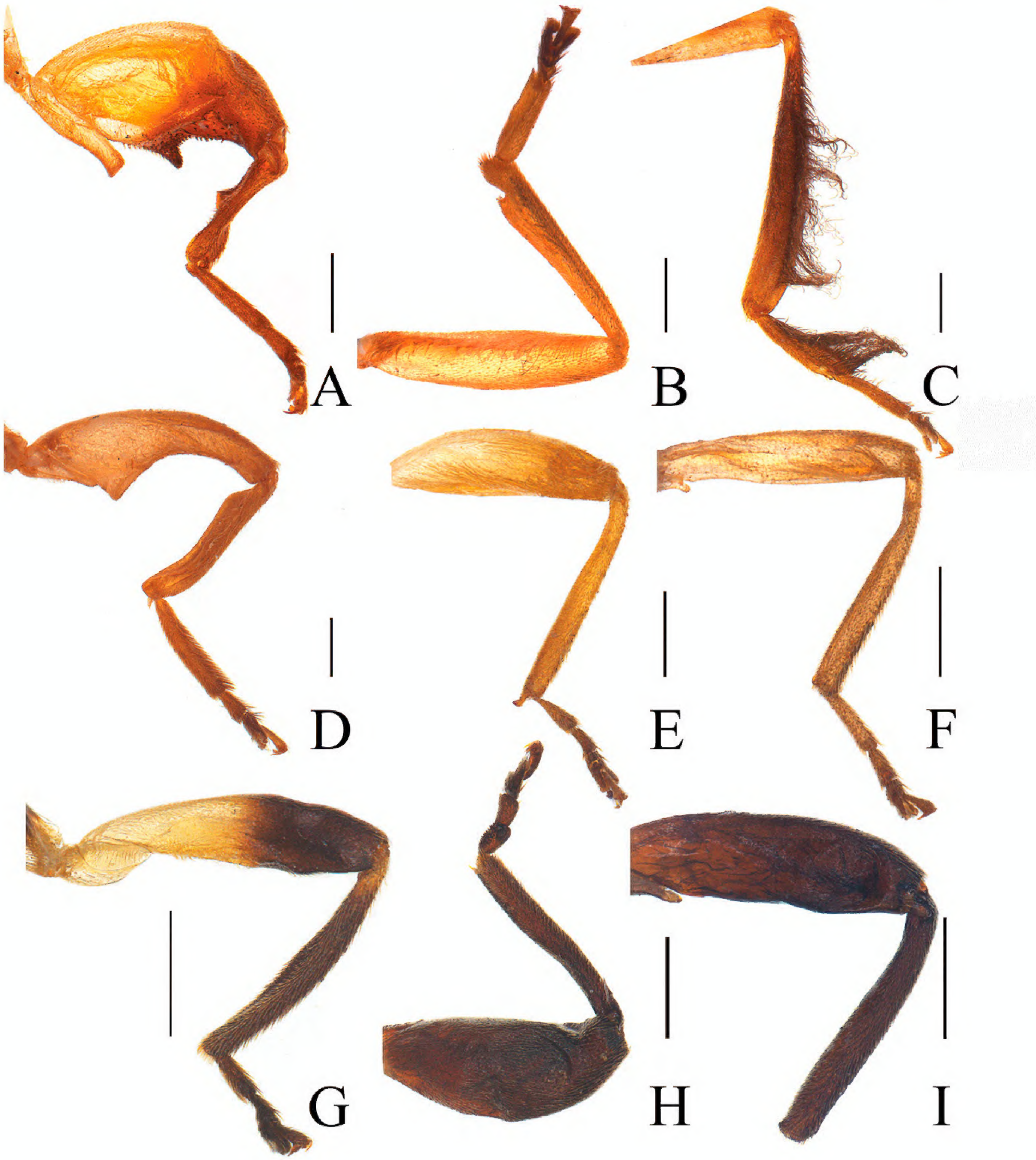

Figure 6. Male legs of *Ichthyurus* species, lateral view (**B, H.** prothoracic-legs; **A, D–G, I.** Mesothoracic-legs; **C.** Metathoracic-legs): **A.** *I. platyurus* Gestro, 1906; **B–D.** *I. laniger* Gestro, 1891; **E.** *I. bisignatus* Pic, 1926; **F.** *I. phungi* Pic, 1923, 1926; **G.** *I. terminalis* sp. nov.; **H, I.** *I. senensomimus* sp. nov. Scale bars: 0.5 mm.

Aedeagus (Fig. 9A–D): right paramere slender and cylindrical, rounded at apex (Fig. 9A, D); left paramere bent in middle (Fig. 9B, C) and hooked at apex (Fig. 9A, D), almost vertically stepped near apical 1/3 part of outer side (Fig. 9A, D), approximately twice longer than right paramere; setifore extension developed and moderately sclerotised, swollen at apex, half the length of left paramere (Fig. 9B, C); median lobe slightly longer than tegmen, widely rounded at apex (Fig. 9A, D).

Female (Fig. 5B). Similar to males, but body larger, eyes less protruding, legs black at apical 1/3 parts of mesofemora and 2/3 parts of metafemora, profemora

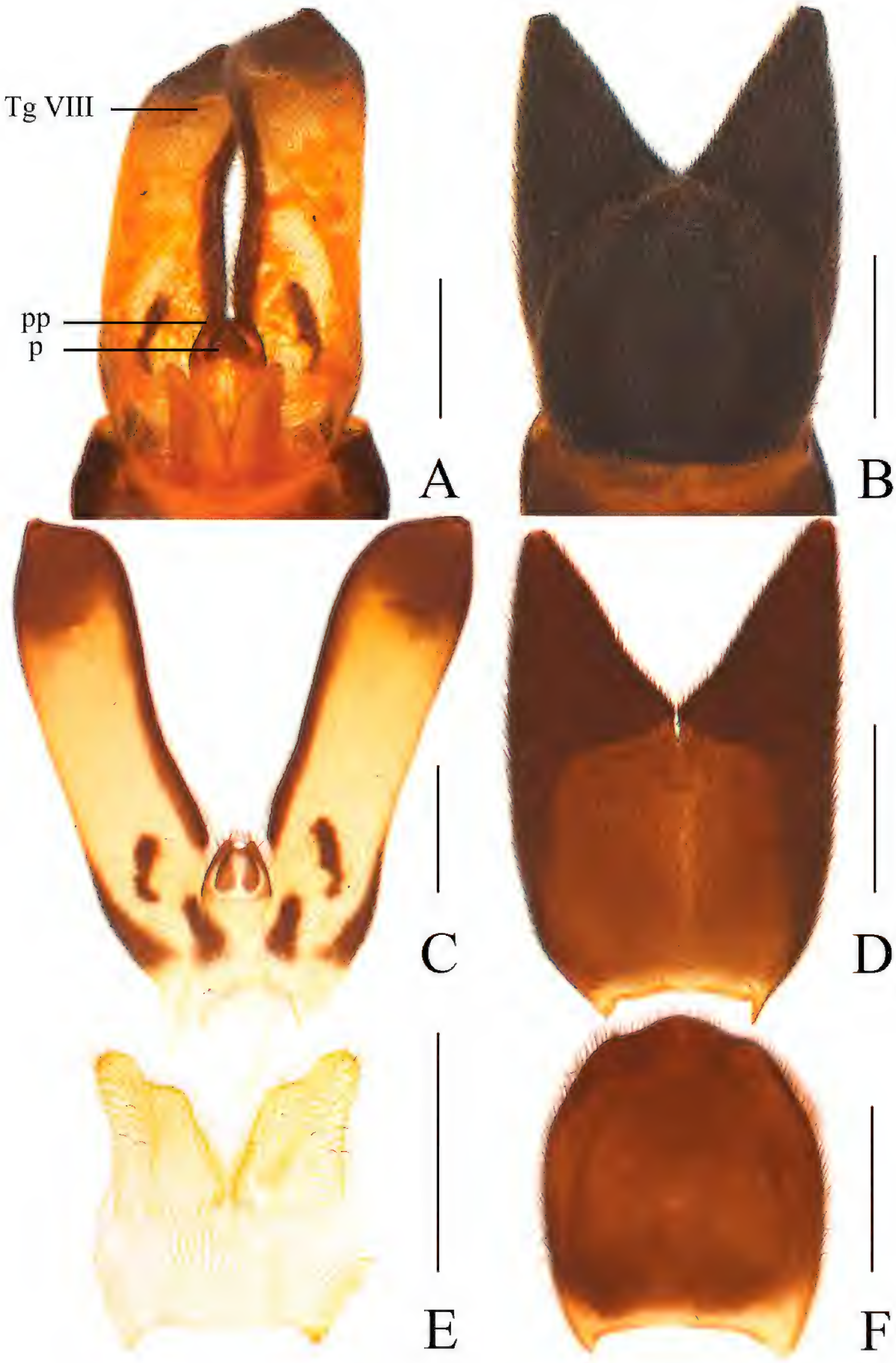

Figure 7. Genital segments of *I. platyurus* Gestro, 1906: **A, B.** Genital segments in natural state; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A, C, E.** Males; **B, D, F.** Females. Abbreviations: Tg VIII: abdominal tergite VIII; p: proctiger; pp: paraproct. Scale bars: 0.5 mm.

uniformly yellow, mesothoracic legs slender and simple; terminal abdominal tergite (Fig. 7B, D) uniformly black, ca. 1.3 times longer than wide, with postero-lateral projections never flattened, approximately half length of the tergite; terminal abdominal ventrite (Fig. 7F) ca. 1.2 times as long as wide, widest near middle, rounded at lateral margins and confluent with outer apical angles, feebly roundly protuberant in middle of posterior margin. Internal organ of the reproductive system (Fig. 10A): bursa copulatrix elongate tube-shaped at apex; accessory gland even in width at apical half part.

Distribution. China (new record: Yunnan), Myanmar.

Ichthyurus laniger Gestro, 1891

Figs 5C–D, 6B–D, 8D, 9E–H, 11

Ichthyurus laniger Gestro, 1891: 581, fig. 42, 1906b: 272, fig. 15.

Type material examined. ***Holotype*** • 1♂ (MGI), [p] "Carin Chebà / 900–1100 m alt. / L. Fea V XIII-88", [h] "laniger / Gestro", [p] "TYPUS".

Additional material examined. China, Yunnan • 1♂ (IZAS), Xishuangbanna, Yunjinghong, 910 m alt., 25.VI.1958, Yiran Zhang leg. • 2♂♂ (IZAS), Xishuangbanna, Menga, 800 m alt., 1.VI.1958, Shuyong Wang leg. • 1♂ (IZAS), Xishuangbanna, Menghun, 550–950 m alt., 6.VI.1958, Chunpei Hong leg. • 1♂1♀ (NWAFU), Xishuangbanna, Menghai, 1160 m alt., 27.V.1974, Yao Zhou & Feng Yuan leg. • 1♀ (MHBU), Lancang, Fubang, Saihan, 1066 m alt., 17.VII.2017, Zhen Zhou & Xiaolong Luo leg. • 1♀ (MHBU), same locality as the preceding, 1066 m alt., 17.VII.2017, Jianfeng Liang, Chengcong Yu leg.

Re-description. Body length (both sexes): 9.2–9.5 mm; body width (both sexes): 1.5–1.6 mm.

Male (Fig. 5C). Colouration. Body yellow, head with a transverse black marking on vertex, antennae black, except for yellow antennomeres I–III; pronotum with a pair of black markings on both sides of disc; elytra with a pair of longitudinal black stripes along lateral margins, except for humeri, as well as a pair of obscure black markings on basal parts of disc; leg black at terminal pro- and mesotarsomeres, as well as meta-tarsi and tibiae; abdomen black, narrowly yellow at anterior and lateral margins.

Eyes strongly protruding, interocular distance ca. 0.4 times of the diameter of an eye. Antennae extending to abdominal tergite III, antennomere II ca. 1/4 length of I, III–XI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.1 times wider than long, anterior margin arcuate, lateral margins nearly parallel, posterior margin bisinuate, anterior angles feebly emarginate, posterior angles nearly rectangular.

Elytra 1.7 times longer than wide, ca. 3.0 times longer than pronotum, with lateral margins feebly sinuate, sutural margins distinctly bisinuate and strongly dehiscent from the basal 1/3 part, distance between sutural margins twice as wide as apical width of an elytron, apices rounded.

Profemora slender and feebly swollen (Fig. 6B), protibiae feebly dilated apically, emarginate near inner apical angles, protarsomeres I widened and lengthened, ca. 5.0 times as long as II; mesotrochanters elongate and obliquely attaching to femora, mesofemora (Fig. 6D) strongly swollen at basal half part, distinctly angled at basal 1/3 portion, arcuately excavated along apical 2/3 part of ventral side, mesotibiae longitudinally ridged laterally, evenly dilated along whole length, mesotarsomeres I distinctly lengthened, ca. 4.0 times longer than II; metafemora moderately swollen (Fig. 5C), metatibiae and metatarsomeres I (Fig. 6C) progressively dilated apically and ridged laterally, densely covered with long hairs, metatarsomere I and II distinctly lengthened and subequal in length.

Terminal abdominal tergite (Figs 11A, C) densely covered with longer pubescence on surface, ca. 1.5 times longer than wide, with postero-lateral projections stout and ca. 1/3 length of the tergite, feebly arcuate at inner and outer margins (Fig. 11C). Proctiger (Fig. 11C) peach-shaped and evenly sclerotised, completely surrounded by paraproct; paraproct (Fig. 11C) strongly developed and tubular, feebly shrunk apically, hardly emarginate in middle of dorso-posterior margin, tergal flange weakly sclerotised, expanded at base and narrowly protruding apically.

Terminal abdominal ventrite (Fig. 11E) trilobed, ca. 1.1 times as long as wide, fissured in middle of apical 3/4 part, with lateral lobes moderately diverging posteriorly and nearly straight at inner margins, bisinuately ridged near inner margins, outer margins feebly sinuate, rounded at both inner and outer apical angles, truncate at posterior margins.

Abdominal sternite IX (Fig. 8D) weakly sclerotised and subparallel-sided, ca. 2.8 times longer than wide, with posterior margin obliquely truncate, posterior right and left angles nearly rectangular, anterior left angle small beak-shaped and right angle strongly protruding anteriorly, strongly expanded and rounded at apex.

Aedeagus (Fig. 9E–H): right paramere elongate and conical, abruptly thinned apically, ca. 3.0 times longer than wide; left paramere nearly straight and hooked at apex (Fig. 9F–H), almost vertically stepped near apical 1/3 part of outer side (Fig. 9E, H), approximately twice longer than right paramere; setifore extension weakly developed, very short and stout (Fig. 9G); median lobe 1.5 times longer than tegmen, progressively narrowed basally (Fig. 9A, D).

Female (Fig. 5D). Similar to males, but body larger, eyes less protruding, all thoracic legs slender and simple, black at all tibiae and tarsi, as well as basal parts of femora; elytra without any black markings on basal parts of disc; terminal abdominal tergite (Fig. 11B, D) never covered with any longer pubescence on surface, ca. 1.5 times longer than wide, with postero-lateral projections ca. 2/5 length of the tergite; terminal abdominal ventrite (Fig. 11F) ca. 1.2 times as long as wide, widest near middle, rounded at lateral margins and confluent with latero-apical angles, feebly roundly protuberant in middle of posterior margin.

Distribution. China (new record: Yunnan), Myanmar.

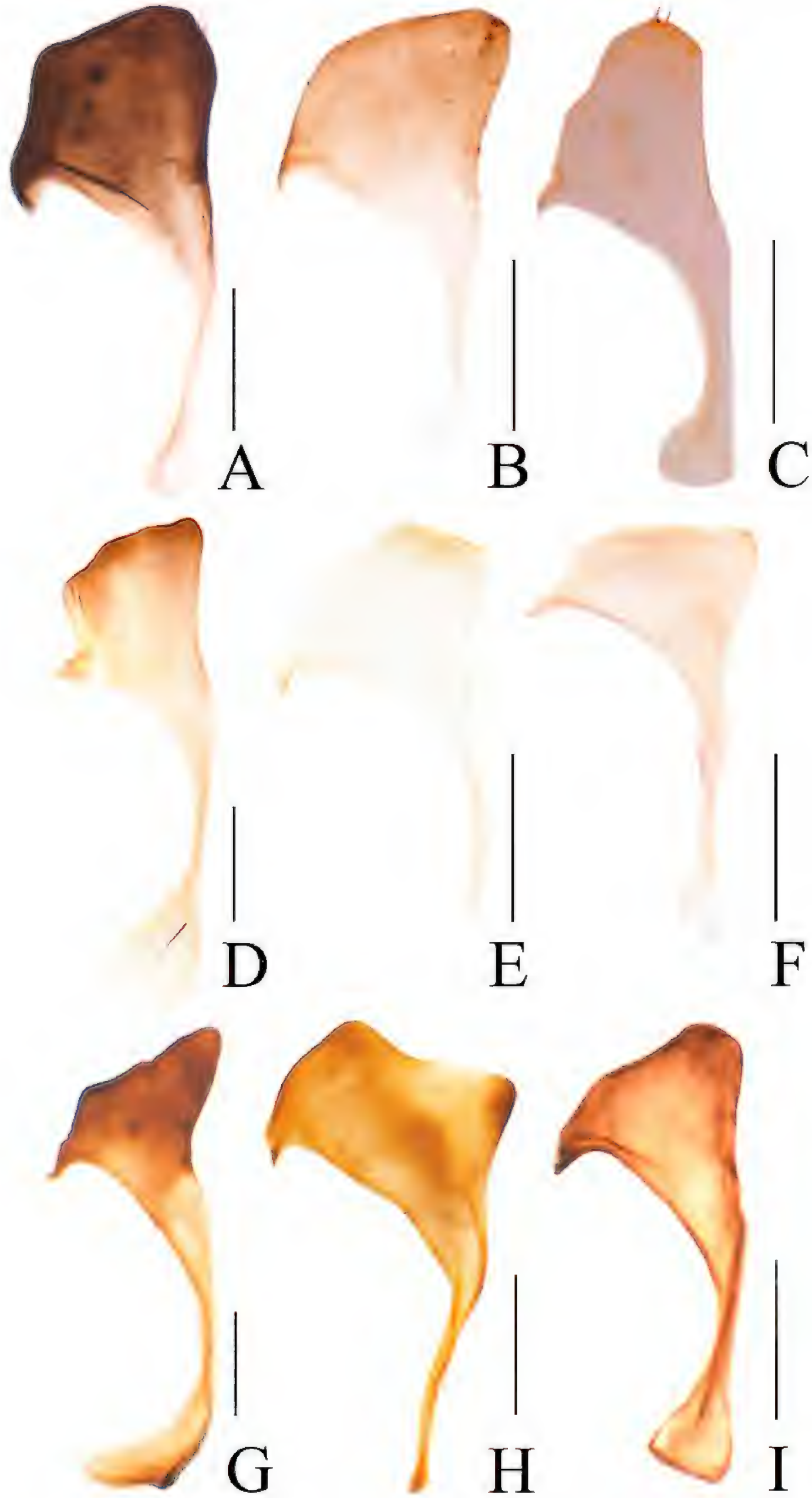

Figure 8. Male abdominal sternite IX of *Ichthyurus* species, ventral view: **A.** *I. senensis* Pic, 1926; **B.** *I. davidi* Gestro, 1892; **C.** *I. platyurus* Gestro, 1906; **D.** *I. laniger* Gestro, 1891; **E.** *I. bisignatus* Pic, 1926; **F.** *I. phungi* Pic, 1923; **G.** *I. cleriformis* sp. nov.; **H.** *I. simplus* sp. nov.; **I.** *I. senensomimus* sp. nov. Scale bars: 0.2 mm.

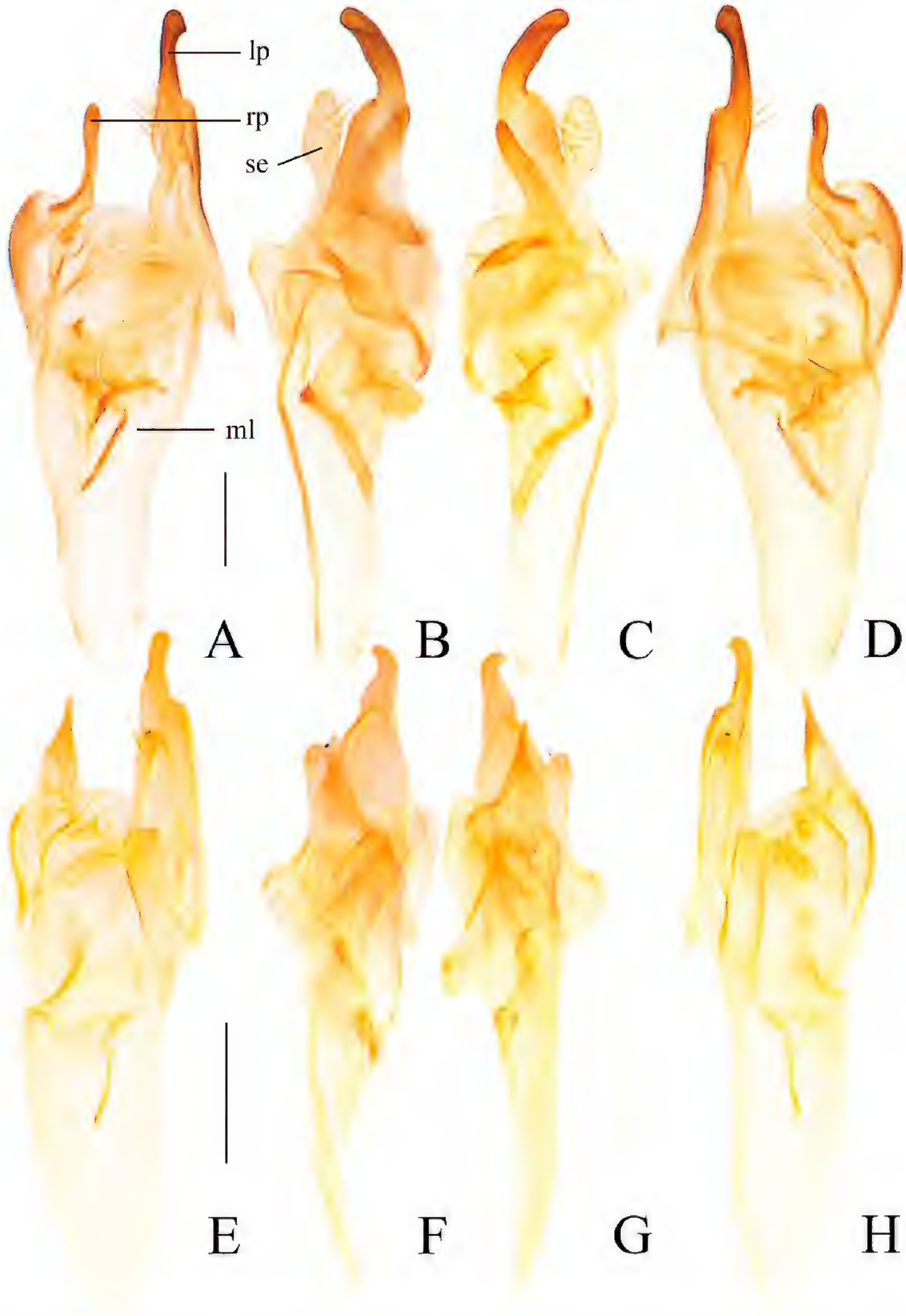

Figure 9. Aedeagi of *Ichthyurus* species: **A–D.** *I. platyurus* Gestro, 1906; **E–H.** *I. laniger* Gestro, 1891. **A, E.** Dorsal views; **B, F.** Left-lateral views; **C, G.** Right-lateral views; **D, H.** Ventral views. Abbreviations: lp: left paramere; ml: median lobe; rp: right paramere; se: setifore extension. Scale bars: 0.2 mm.

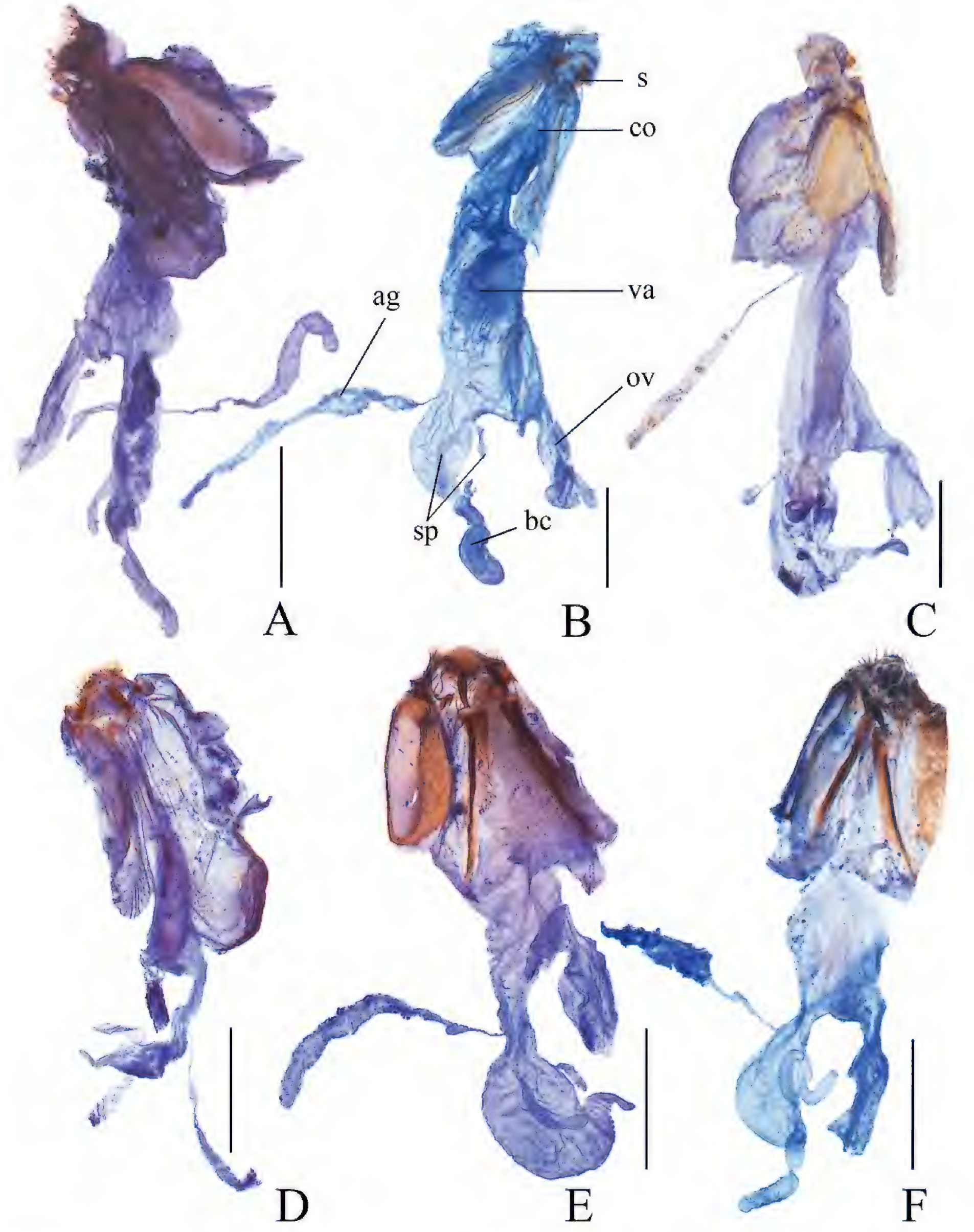

Figure 10. Internal organs of female reproductive systems of *Ichthyurus* species, ventro-lateral views: **A.** *I. platyurus* Gestro, 1906; **B.** *I. bisignatus* Pic, 1926; **C.** *I. phungi* Pic, 1923; **D.** *I. terminalis* sp. nov.; **E.** *I. cleriformis* sp. nov.; F. *I. senensomimus* sp. nov. Abbreviations: ag: accessory gland; bc: bursa copulatrix; co: coxite; ov: median oviduct; s: style; sp: spermatheca; va: vagina. Scale bars: 1.0 mm.

Figure 11. Genital segments of *I. laniger* Gestro, 1891: **A, B.** Genital segments in natural state; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A, C, E.** Male; **B, D, F.** Female. Scale bars: 0.5 mm.

Ichthyurus bisignatus Pic, 1926

Figs 6E, 8E, 10B, 12A–B, 13, 14A–D

Ichthyurus bisignatus Pic, 1926: 5.

Type material examined. ***Holotype*** • 1♀ (MNHN), [h] "Hoa Binh", [h] "bisignatus / n. sp.", [h] "HOLOTYPUS".

Additional material examined. China, Yunnan • 1♂1♀ (IZAS), Menglongbanna, Mengsong, 1600 m alt., 25.IV.1958, Fuji Pu leg. • 1♂ (IZAS), same locality as the preceding, 1600 m alt., 25.IV.1958, Shuyong Wang leg. • 1♂ (IZAS), same locality as the preceding, 1600 m alt., 26.IV.1958, Shuyong Wang leg. • 1♂ (IZAS), same locality as the preceding, 1600 m alt., 25.IV.1958, Chunpei Hong leg.

Re-description. Body length (both sexes): 8.0–8.1 mm; body width (both sexes): 1.5 mm.

Male (Fig. 12A). Colouration. Body yellow, head with a black transverse marking on vertex, antennae black, except for yellow antennomeres I–III; pronotum with a pair of black semi-rounded markings in middle of disc; elytra with a pair of longitudinal black stripes along lateral margins, except for humeri, as well as a pair of black ovate markings on basal parts of disc; leg black at tarsi and slightly darkened at tibiae; abdomen black, yellow laterally, terminal abdominal tergite with postero-lateral projections black at apices.

Eyes strongly protruding, interocular distance ca. 0.4 times of the diameter of an eye. Antennae extending to elytral apices, antennomere II ca. 1/4 length of I, III–XI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.1 times wider than long, anterior margin arcuate, lateral margins nearly parallel, posterior margin bisinuate, anterior angles feebly emarginate, posterior angles nearly rectangular.

Elytra 1.6 times longer than wide, ca. 2.4 times longer than pronotum, with lateral margins feebly sinuate, sutural margins feebly bisinuate and moderately dehiscent from the basal 1/3 part, distance between sutural margins as wide as apical width of an elytron, apices subrounded.

Pro- and metathoracic legs slender and simple (Fig. 12A); mesotrochanters each with a small and acute tooth at apex (Fig. 12A), mesofemora (Fig. 12A) moderately swollen and smooth ventrally, without any tooth, mesotibiae each with an unciform process at apex (Fig. 6E).

Terminal abdominal tergite (Fig. 13A, C) ca. 1.2 times longer than wide, with postero-lateral projections very stout and short, ca. 1/8 length of the tergite, nearly straight at inner margins, and slightly arcuate at outer margins (Fig. 13C). Proctiger (Fig. 13C) peach-shaped and sclerotised apically, completely surrounded by paraproct; paraproct (Fig. 13C) weakly developed and tubular, feebly shrunk apically, hardly emarginate in middle of dorso-posterior margin, tergal flange weakly sclerotised, expanded at base and narrowly protruding apically.

Terminal abdominal ventrite (Fig. 13E) trilobed, ca. 1.2 times as long as wide, fissured in middle of apical 3/4 part, with lateral lobes moderately diverging posteriorly and sinuate at inner margins, arcuately ridged near inner margins, moderately arcuate at outer margins, rounded at apices.

Abdominal sternite IX (Fig. 8E) weakly sclerotised and narrowed posteriorly, ca. 1.5 times longer than wide, with posterior margin truncate, posterior right angle rectangular and left angle widely rounded, anterior left angle small beak-shaped and right angle strongly protruding anteriorly.

Aedeagus (Fig. 14A–D): right paramere slender and cylindrical, acute at apex (Fig. 14A, D); left paramere feebly bent in middle (Fig. 14B, C), compressed laterally at apical half part and coarsely hooked at apex (Fig. 14A, D), approximately twice longer than right paramere (Fig. 14A, D); setifore extension developed and weakly sclerotised, 1/3 length of left paramere (Fig. 14A, D); median lobe as long as tegmen, progressively narrowed basally (Fig. 14A, D).

Female (Fig. 12B). Similar to males, but body larger, eyes less protruding, mesothoracic legs slender and simple, elytra with narrower longitudinal black stripes; terminal abdominal tergite (Fig. 13B, D) ca. 1.2 times longer than wide, with postero-lateral projections ca. 1/4 length of the tergite; terminal abdominal ventrite (Fig. 13F) ca. 1.2 times as long as wide, widest near middle, rounded at lateral and posterior margins and confluent with latero-apical angles. Internal organ of the reproductive system (Fig. 10B): bursa copulatrix tube-shaped at apex; accessory gland even in width at apical half part.

Distribution. China (new record: Yunnan), Vietnam.

Ichthyurus phungi Pic, 1923

Figs 6F, 8F, 10C, 12C–D, 14E–H, 15

Ichthyurus phungi Pic, 1923: 3.

Type material examined. ***Holotype*** • 1♀ (MNHN), Hoa Binh / (Tonkin)", [h] "phungi / n. sp.", [p] "HOLOTYPUS".

Additional material examined. China. Zhejiang • 1♂3♀♀ (IZAS), "Mokan Shan, 1–3. V. 1936, O. PIEL leg.".

Re-description. Body length (both sexes): 5.7–6.5 mm; body width (both sexes): 1.2–1.3 mm.

Male (Fig. 12C). Colouration. Body yellow, head with a black transverse marking on vertex, antennae black, except for yellow antennomeres I–III; pronotum with M-form black markings in middle of disc; elytra with a pair of longitudinal black stripes around humeri and along lateral margins, but not reaching apices; leg black at tarsi and slightly darkened at tibiae; abdomen black, except for yellow at posterior and lateral margins, terminal abdominal tergite with postero-lateral projections black at apices.

Eyes moderately protruding, interocular distance ca. 0.6 times of the diameter of an eye. Antennae extending to abdominal tergite III, antennomere II ca. 1/3 length of I, III–XI subequal in length and approximately twice longer than II.

Pronotum 1.2 times wider than long, anterior margin slightly arcuate, lateral margins nearly parallel, posterior margin bisinuate, anterior angles feebly emarginate, posterior angles nearly rectangular.

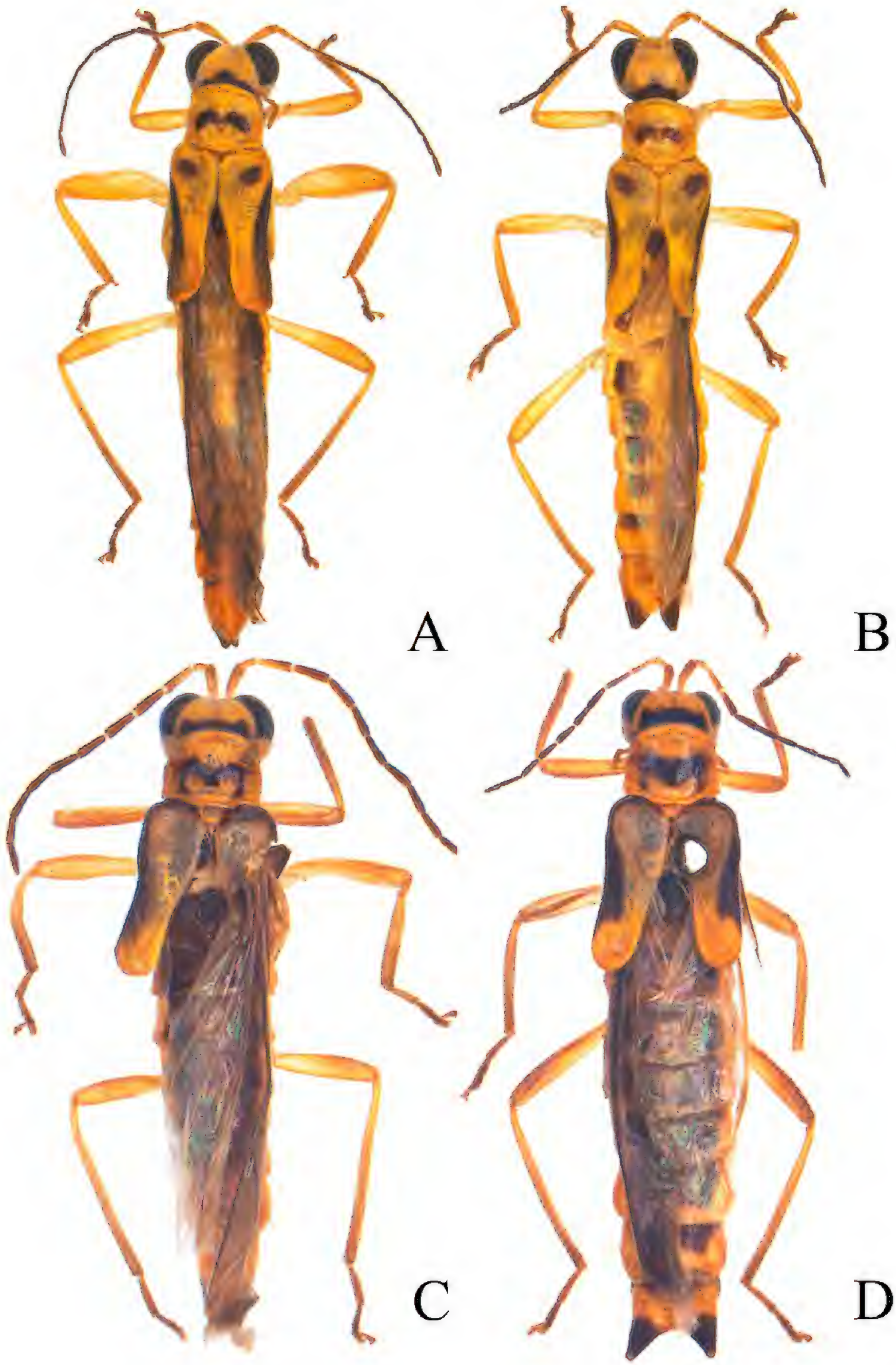

Figure 12. Habitus of *Ichthyurus* species, dorsal view: **A, B.** *I. bisignatus* Pic, 1926; **C, D.** *I. phungi* Pic, 1923; **A, C.** Males; **B, D.** Females. Scale bars: 2.0 mm.

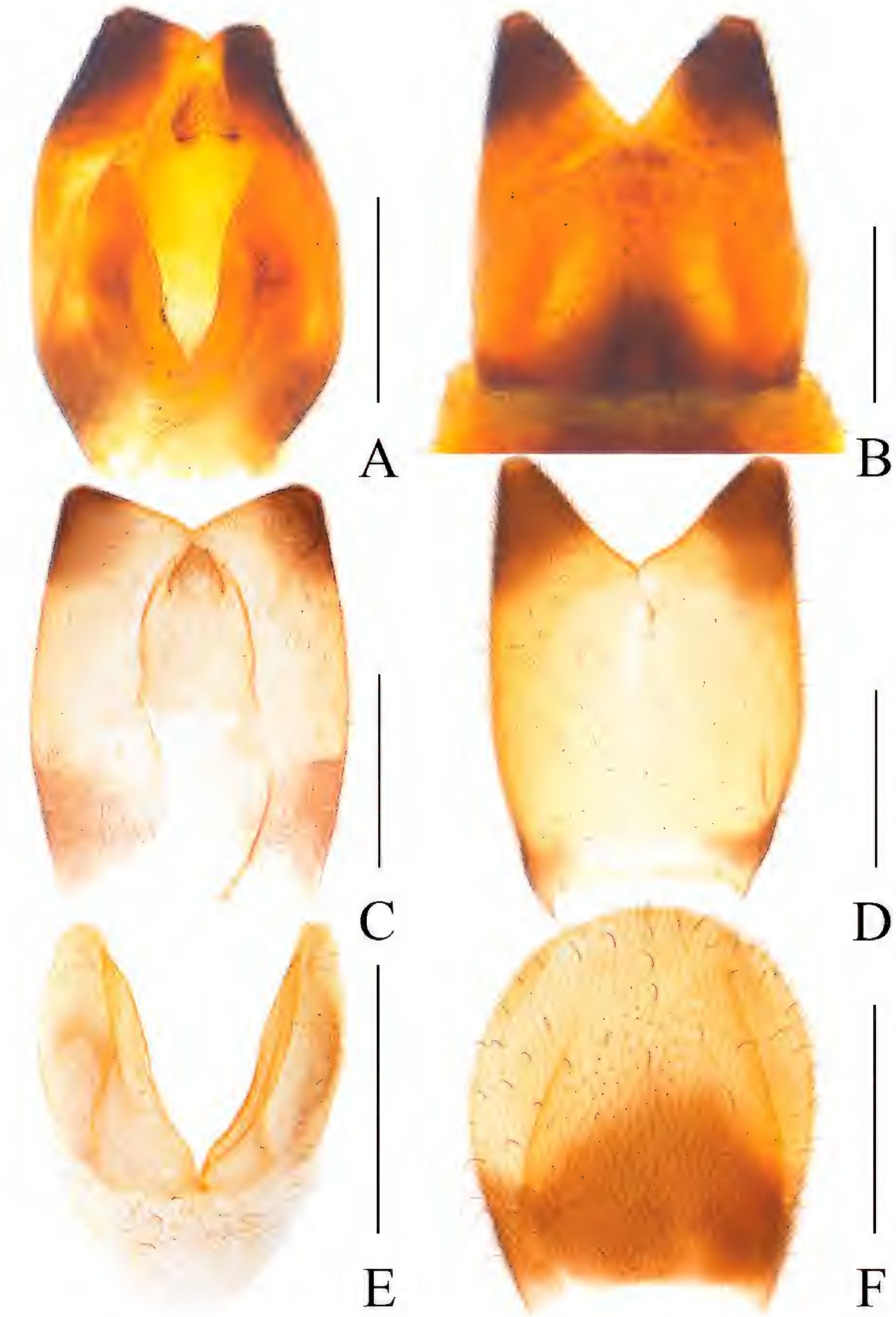

Figure 13. Genital segments of *I. bisignatus* Pic, 1926: **A, B.** Genital segments in natural state; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A, C, E.** Males; **B, D, F.** Females. Scale bars: 0.5 mm.

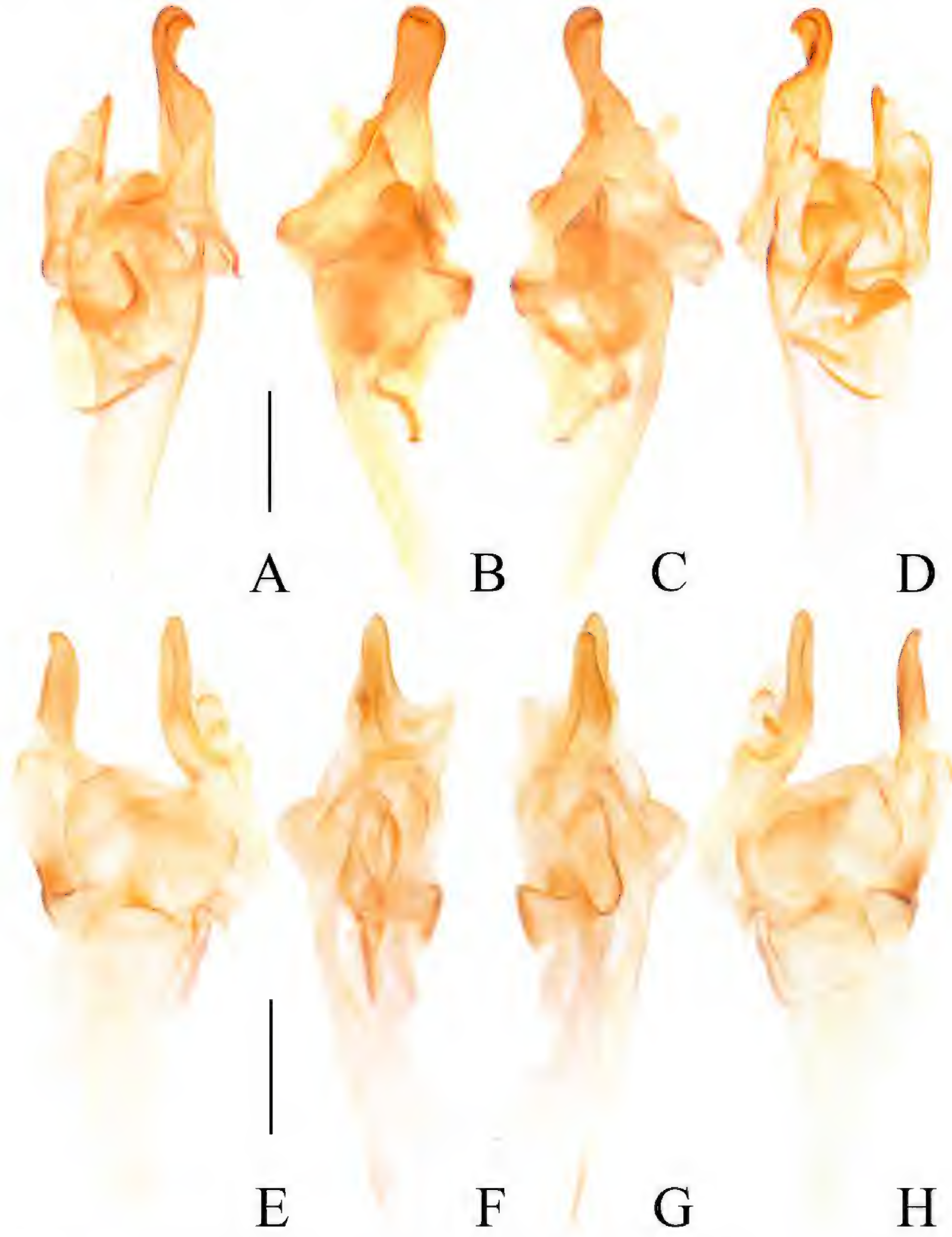

Figure 14. Aedeagi of *Ichthyurus* species: **A–D.** *I. bisignatus* Pic, 1926; **E–H.** *I. phungi* Pic, 1923; **A, E.** Dorsal views; **B, F.** Left-lateral views; **C, G.** Right-lateral views; **D, H.** Ventral views. Abbreviations: lp: left paramere; ml: median lobe; rp: right paramere; se: setifore extension. Scale bars: 0.2 mm.

Elytra 1.5 times longer than wide, ca. 2.6 times longer than pronotum, with lateral margins nearly parallel, sutural margins feebly sinuate and completely dehiscent from base, distance between sutural margins as wide as apical width of an elytron, apices rounded.

All thoracic legs slender and simple (Fig. 12C); mesotrochanters (Fig. 6F) each with a small and acute tooth at apex, mesotarsomeres (Fig. 6F) I lengthened and ca. 2.2 times longer than II.

Terminal abdominal tergite (Fig. 15A, C) ca. 1.2 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite, feebly arcuate at inner and outer margins (Fig. 15C). Proctiger (Fig. 15C) peach-shaped and sclerotised apically, completely surrounded by paraproct; paraproct (Fig. 15C) weakly developed and tubular, feebly shrunk apically, feebly emarginate in middle of dorso-posterior margin, tergal flange weakly sclerotised, expanded at base and narrowly protruding apically.

Terminal abdominal ventrite (Fig. 15E) trilobed, ca. 1.5 times as long as wide, fissured in middle of apical 3/4 part, with lateral lobes strongly diverging posteriorly and bidentate at inner margins, of which the subapical teeth large and rectangular, while the middle ones small and acute, nearly straight at outer margins, rounded at apices.

Abdominal sternite IX (Fig. 8F) weakly sclerotised and subparallel-sided, approximately twice longer than wide, with posterior margin truncate, posterior right angle rectangular and left angle widely rounded, anterior left angle elongate beak-shaped and right angle strongly protruding anteriorly.

Aedeagus (Fig. 14E–H): right paramere slender and cylindrical, feebly hooked at apex (Fig. 14E, H); left paramere straight and cylindrical, rounded at apex (Fig. 14E, H), feebly longer than right paramere; setifore extension stout and weakly sclerotised, half the length of left paramere (Fig. 14A, D); median lobe as long as tegmen, progressively narrowed basally (Fig. 14E, H).

Female (Fig. 12D). Similar to males, but body larger, eyes less protruding; terminal abdominal tergite (Fig. 15B, D) ca. 1.1 times longer than wide, with postero-lateral projections approximately half the length of the tergite, outer margins nearly straight; terminal abdominal ventrite (Fig. 15F) 1.1 times as wide as long, widest near base, rounded at lateral margins and confluent with outer apical angles, rectangularly protuberant in middle of posterior margin. Internal organ of the reproductive system (Fig. 10C): bursa copulatrix tail-shaped at apex; accessory gland even in width at apical half part.

Distribution. China (new record: Zhejiang), Vietnam.

Ichthyurus terminalis Y. Yang, Lin & X. Yang, sp. nov.

https://zoobank.org/C7342C5C-BCAF-4CB2-AF13-A540C2ED0D03

Figs 6G, 10D, 16A–B, 17,18A–D

Type material. ***Holotype.*** China. Yunnan • ♂ (IZAS), Xishuangbanna, Damenglong, 650 m alt., 11.VII.1958, Yiran Zhang leg.

Paratype. China. Yunnan • 1♀ (IZAS), same locality as holotype, 9.VII.1958, Leyi Zheng leg. • 1♀ (IZAS), same locality as holotype, 9.VII.1958, Chunpei Hong leg.

Differential diagnosis. This species could be easily distinguished from all others of *Ichthyurus* by the characteristic terminal abdominal sternite VIII (Fig. 17C) and IX (Fig. 17F) of male, proctiger and paraproct (Fig. 17E), as well as structures of aedeagus (Fig. 18A–D).

Description. Body length: 8.0–8.6 mm, (8.0 mm in holotype); body width: 1.5–1.7 mm (1.5 mm in holotype).

Male (Fig. 16A). Colouration. Body black, head yellow before antennal sockets, antennomeres I–III yellow, prosternum yellow, pronotum yellow with a large black marking extending to middle of anterior margin and anterior parts of lateral margins, scutellum yellow, elytra with a large X-form yellow marking occupying around humeri, along suture and near to apices, legs yellow at trochanters and basal parts of femora and metatibiae, abdomen yellow posteriorly and laterally.

Eyes strongly protruding, interocular distance approximately half as wide as the diameter of an eye. Antennae extending to posterior margin of abdominal tergite II, II ca. 1/3 length of I, III–XI subequal in length and approximately twice longer than II.

Pronotum 1.1 times wider than long, anterior margin arcuate, lateral margins feebly diverging posteriorly, posterior margin bisinuate, anterior angles subrounded, posterior angles nearly rectangular.

Elytra 1.3 times longer than wide, 1.8 times longer than pronotum, with lateral margins slightly sinuate, sutural margins distinctly sinuate and moderately dehiscent from the base 1/3 part, distance between sutural margins twice as wide as apical width of an elytron, apices rounded.

Pro- and mesofemora slightly swollen (Fig. 16A), protibiae shallowly excavated at inner 2/3 part (Fig 16A); metathoracic legs slender and simple.

Terminal abdominal tergite (Fig. 17A) 1.4 times longer than wide, with postero-lateral projections approximately half length of the tergite, feebly sinuate at inner margins, feebly arcuate at outer margins. Proctiger (Fig. 17E) reniform and laterally sclerotised, protruding over paraproct; paraproct (Fig. 17E) strongly developed, trapezoidal, with posterior angles acute and strongly projecting posteriorly and anterior angles projecting laterally.

Terminal abdominal ventrite (Fig. 17C) peltate, ca. 1.5 times as long as wide, fissured in middle of apical 1/4 part, with lateral lobes straight at inner margins, sinuate at outer margins, rectangular at outer apical angles, strongly protuberant and acute at inner apical angles, with a pair of short and conical protrusions near outer apical angles, each protrusion with a tuft of stout setae at apex.

Abdominal sternite IX (Fig. 17F) weakly sclerotised and narrowed posteriorly, short and 1.2 times as long as wide, with posterior margin rounded and confluent with anterior right and left angles, anterior left angle triangular and right angle moderately protruding anteriorly.

Aedeagus (Fig. 18A–D): right paramere compressed laterally, elongate and tapered apically (Fig. 18B, C);

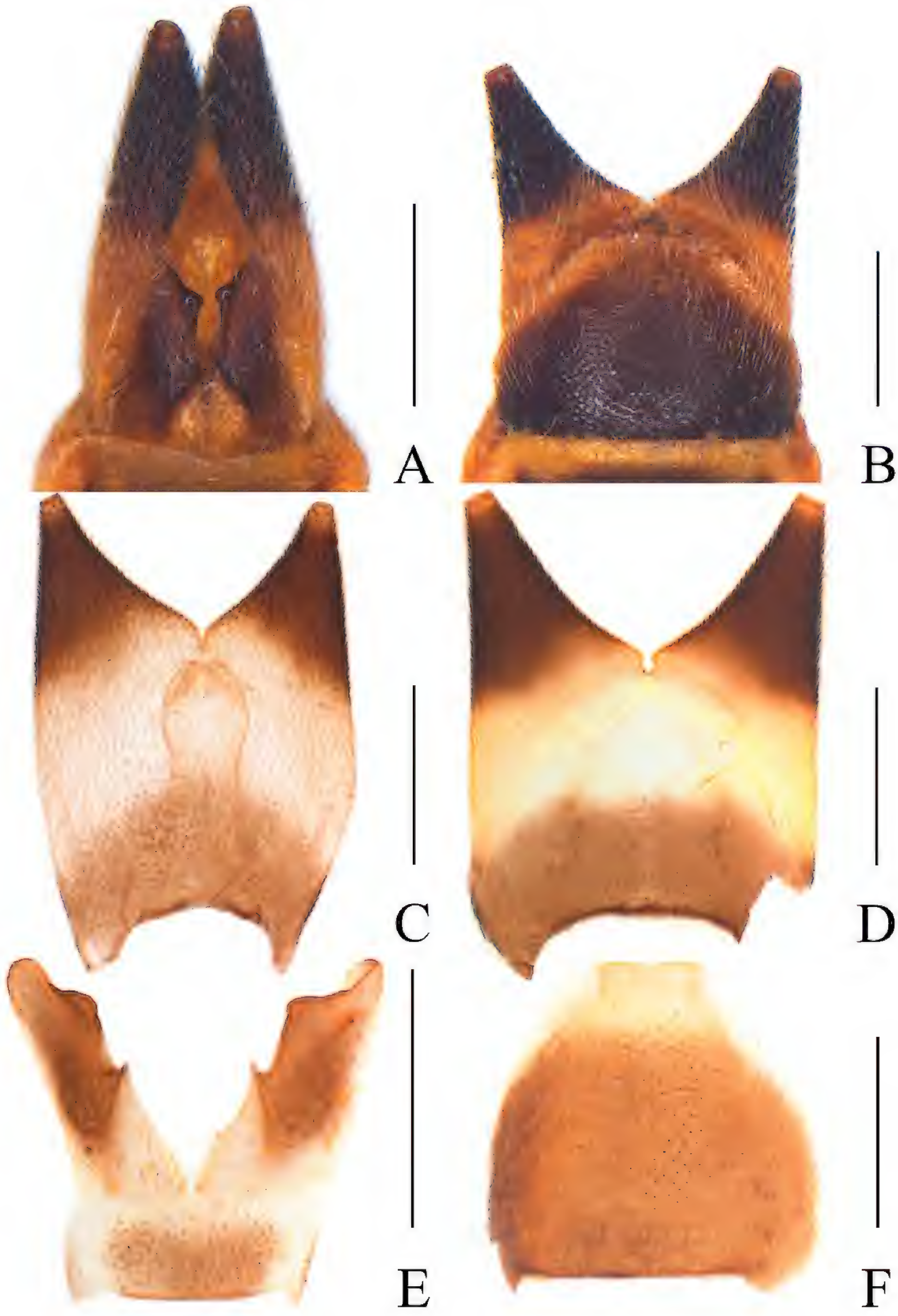

Figure 15. Genital segments of *I. phungi* Pic, 1923: **A, B.** Genital segments in natural state; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A, C, E.** Males; **B, D, F.** Females. Scale bars: 0.5 mm.

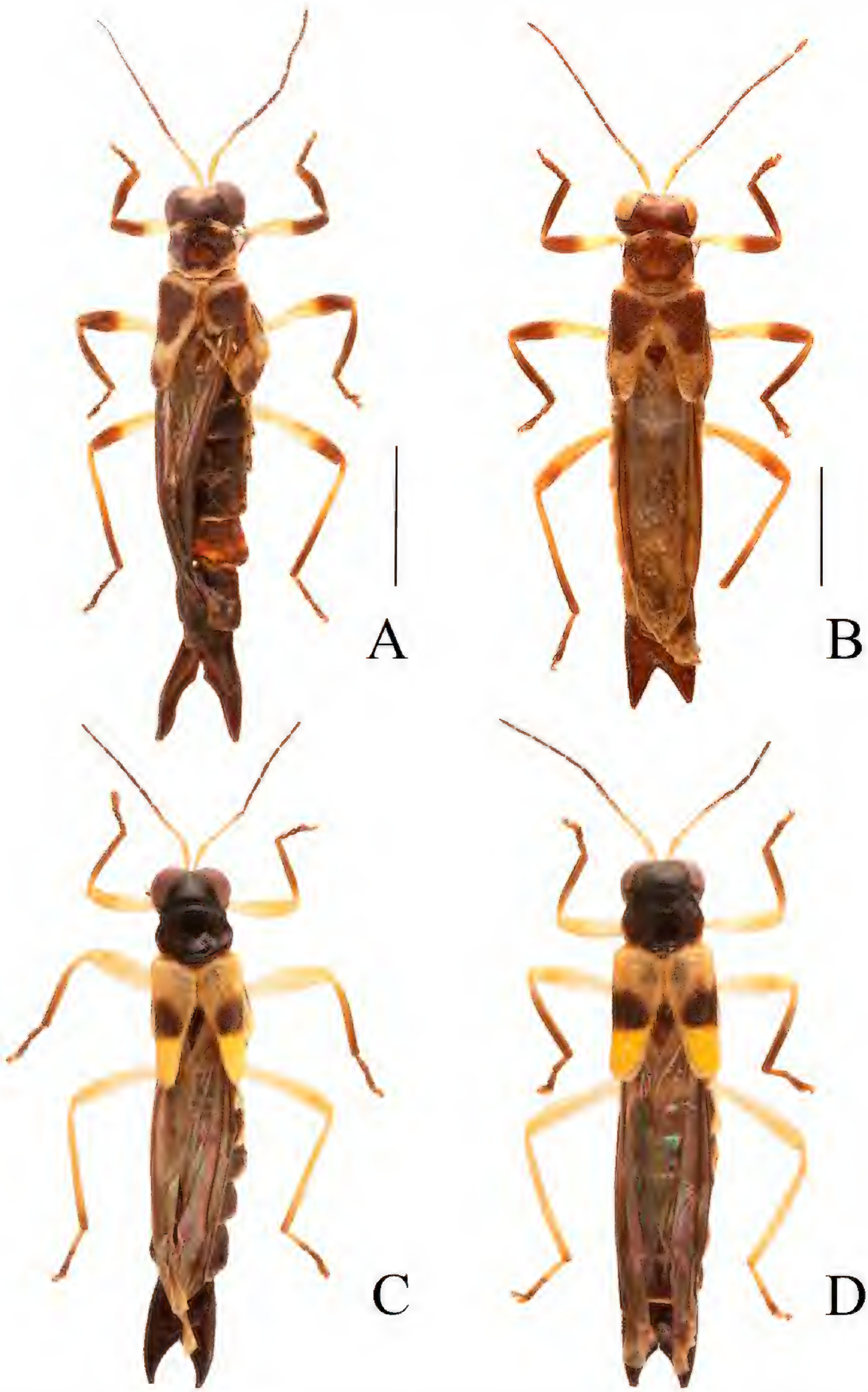

Figure 16. Habitus of *Ichthyurus* species, dorsal view: **A, B.** *I. terminalis* sp. nov.; **C, D.** *I. cleriformis* sp. nov.; **A, C.** Males; **B, D.** Females. Scale bars: 2.0 mm.

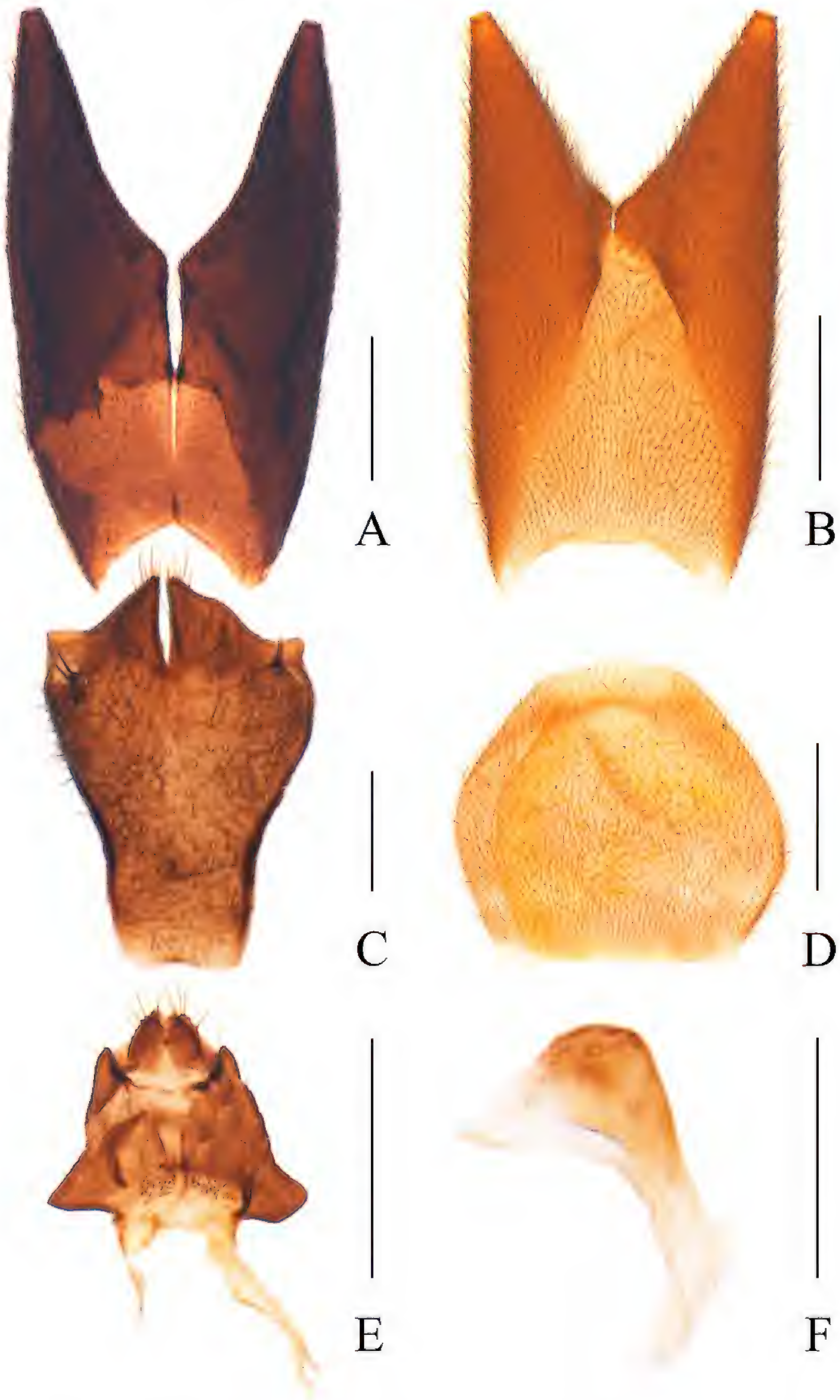

Figure 17. Genital segments of *I. terminalis* sp. nov.: **A, B.** Terminal abdominal tergites, ventral view; **C, D.** Terminal abdominal ventrites, ventral view; **E.** Proctiger and paraproct, ventral view; **F.** Abdominal sternite IX, ventral view **A, C, E, F.** Males; **B, D.** Females. Scale bars: 0.5 mm (**A–E**); 0.2 mm (**F**).

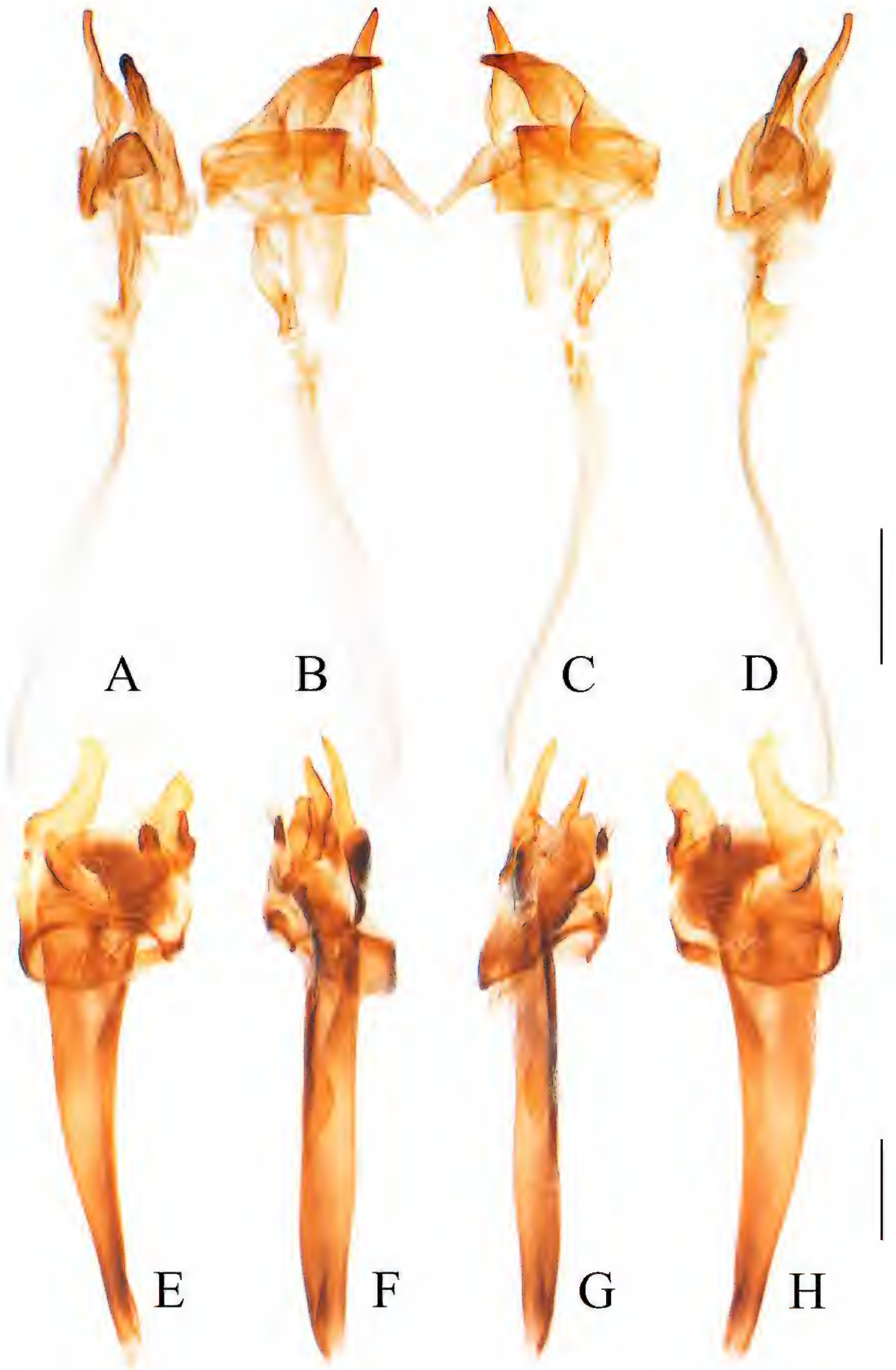

Figure 18. Aedeagi of *Ichthyurus* species: **A–D.** *I. terminalis* sp. nov.; **E–H.** *I. cleriformis* sp. nov. **A, E.** Dorsal views; **B, G.** Left-lateral views; **C, F.** Right-lateral views; **D, H.** Ventral views. Abbreviations: lp: left paramere; ml: median lobe; rp: right paramere; se: setifore extension. Scale bars: 0.2 mm.

left paramere compressed laterally, horn-shaped, acute at apex, approximately as long as right paramere (Fig. 18B, C); setifore extension well-developed and conical, 4/5 length of left paramere (Fig. 18B, C); median lobe extremely long, ca. 4.0 times longer than tegmen, even in width along whole length (Fig. 18A–D).

Female (Fig. 16B). Similar to males, but body larger, eyes less protruding, prothoracic legs simple; abdominal tergite VIII (Fig. 17B) ca. 1.5 longer than wide, with postero-lateral projections ca. 2/5 length of the tergite and straight at inner margins; abdominal sternite VIII (Fig. 17D) ca. 1.2 times as wide as long, widest near middle, rounded at lateral margins and confluent with outer apical angles, nearly straight at posterior margin. Internal organs of female reproductive system (Fig. 10D): bursa copulatrix tail-shaped at apex; accessory gland even in width at apical half part.

Etymology. The specific name is derived from the Latin *terminus* (an end), referring to its characteristic terminal abdominal ventrite.

Distribution. China (Yunnan).

Ichthyurus cleriformis Y. Yang, Lin & Liu, sp. nov.

https://zoobank.org/A546E8C1-3D4A-4310-8DFC-D96CF26BAC49

Figs 8G, 10E, 16C–D, 18E–H, 19

Type material. ***Holotype.*** Laos • ♂ (MHBU), "Laos, Vientiane, Phone Thong, Hin Herp, 212 m alt., 28.VI.2015, Haoyu Liu leg."

Paratypes. Laos • 17♂♂6♀♀ (MHBU), "Phoukhao, NationBio, 29.VI.2015, Haoyu Liu leg.". China, Yunnan • 1♀ (NWAFU), Mengyang, 750 m alt., 6.VI.1991, Yinglun Wang & Ruigang Tian leg.

Differential diagnosis. This species can be attributed to the *I. bourgeoisi* group by the terminal abdominal tergite of male with postero-lateral projections excavated ventrally and arcuately, delimited with edges, which are keeled and hooked terminally (Fig. 19A, C vs. Lin et al. (2024a): figs 10A–D, 14A, B), but it can be easily distinguished from other members by the body coloration (Fig. 16C, D vs. Lin et al. (2024a): figs 9, 13) and details in the shape of terminal abdominal ventrite of male (Fig. 19E vs. Lin et al. (2024a): figs 10E, F, 14D, E) and female (Fig. 19F vs. Lin et al. (2024a): fig. 12B, D), as well as aedeagus (Fig. 18E–H vs. Lin et al. (2024a): figs 11, 15).

Description. Body length (both sexes): 6.9–7.0 mm (7.0 mm in holotype); body width (both sexes): 1.2–1.3 mm (1.2 mm in holotype).

Male (Fig. 16C). Colouration. Body black, antennomeres I–III yellow, elytra yellowish-orange, with a pair of black rounded markings in middle of disc, legs yellow, except for black tarsi and apical parts of tibiae, abdomen yellow posteriorly and laterally.

Eyes strongly protruding, interocular distance ca. 0.4 times of the diameter of an eye. Antennae extending to elytral apices, antennomere II ca. 1/4 length of I, III–XI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.3 times wider than long, anterior margin arcuate, lateral margins strongly arcuate, posterior margin strongly bisinuate, anterior angles feebly emarginate, posterior angles nearly rectangular.

Elytra 1.5 times longer than wide, ca. 2.3 times longer than pronotum, with lateral margins nearly parallel, sutural margins sinuate and moderately dehiscent from the basal 1/3 part, distance between sutural margins twice as wide as apical width of an elytron, apices rounded.

Pro- and mesofemora (Fig. 16C) slightly swollen, metathoracic legs slender and simple.

Terminal abdominal tergite (Fig. 19A, C) ca. 1.5 times longer than wide, with postero-lateral projections ca. 2/5 length of the tergite, distinctly arcuate at both inner and outer margins, excavated ventrally and arcuately, delimited with edges, which are keeled and feebly hooked terminally (Fig. 19A). Proctiger (Fig. 19C) triangular and evenly sclerotised, completely surrounded by paraproct; paraproct (Fig. 19C) strongly developed and tubular, feebly shrunk apically, deeply emarginate in middle of dorso-posterior margin, tergal flange (destroyed and missing).

Terminal abdominal ventrite (Fig. 19E) inverted trapezoidal, ca. 1.3 times as long as wide, largely and rectangularly emarginate in middle, with middle emargination as deep as 1/3 length of the ventrite, outer apical angles rounded at apices, longitudinally and arcuately ridged near middle and on both sides, transversely and arcuately ridged near outer apical angles.

Abdominal sternite IX (Fig. 8G) moderately sclerotised and subparallel-sided, ca. 3.0 times longer than wide, with posterior margin obliquely truncate, posterior right angle narrowly triangular and left angle widely triangular, anterior left angle small beak-shaped and right angle strongly protruding anteriorly, moderately expanded and boot-shaped at apex.

Aedeagus (Fig. 18E–H): right paramere dorso-ventrally flattened, feebly bent, obtuse beak-like at apex (Fig. 18E, H), approximately twice as long as wide; left paramere dorso-ventrally flattened, bifurcate near apex, with inner branch acute at apex and much longer than outer one, feebly shorter than right paramere (Fig. 18F, G); setifore extension strongly sclerotised, stout and short, 1/3 length of left paramere (Fig. 18E–G); median lobe 3.0 times as long as tegmen, strongly narrowed basally (Fig. 18E, H).

Female (Fig. 16D). Similar to males, but body larger, eyes less protruding; terminal abdominal tergite (Fig.19B, D) ca. 1.2 times longer than wide, with postero-lateral projections ca. 2/5 length of the tergite; terminal abdominal ventrite (Fig. 19F) unevenly sclerotised and weaker on both sides, ca. 1.2 times as long as wide, widest near middle, rounded at lateral margins and confluent with outer apical angles, shallowly and roundly emarginate in middle of posterior margin. Internal organ of the reproductive system (Fig. 10E): bursa copulatrix tail-shaped at apex; accessory gland even in width at apical half part.

Etymology. The specific name is derived from the Latin *-formis* (-like), referring to its similarity to some Cleridae species in the appearance.

Distribution. China (Yunnan), Laos.

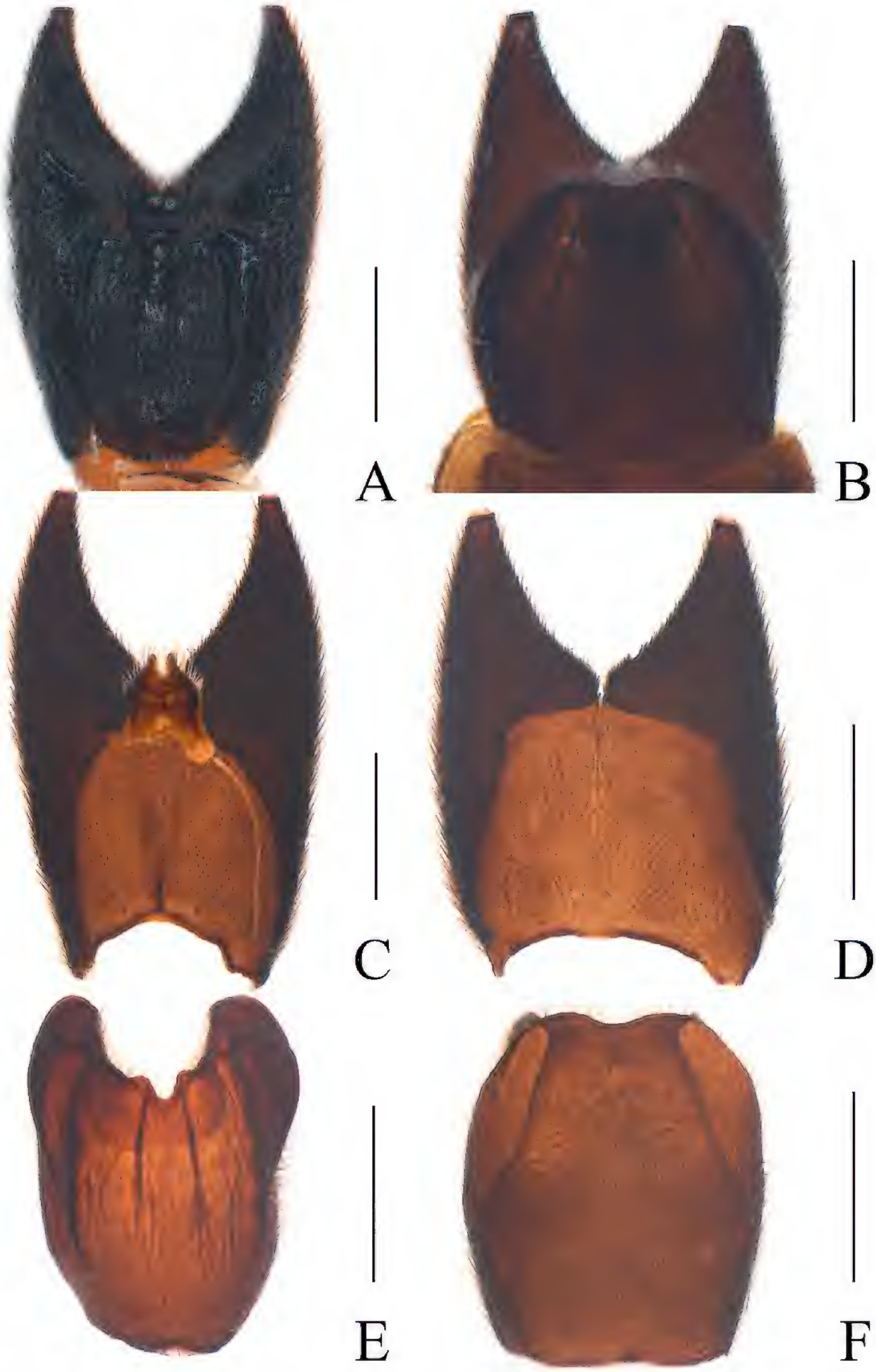

Figure 19. Genital segments of *I. cleriformis* sp. nov.: **A, B.** Genital segments in natural state; **C, D.** Terminal abdominal tergites, ventral view; **E, F.** Terminal abdominal ventrites, ventral view; **A, C, E.** Males; **B, D, F.** Females. Scale bars: 0.5 mm.

Ichthyurus simplus Y. Yang, Lin & Liu, sp. nov.

https://zoobank.org/F4EB7738-40C3-4494-9EE5-3B7A4E86C5A7

Figs 8H, 20A, B, 21, 22A–D

Type material. ***Holotype.*** China. Guangxi • ♂ (MHBU), Guanyang, Taizishan, Zhupoling, 6.V.2021, Junbo Tong leg.

Paratype. China. Guangxi • 1♀ (MHBU), same data as holotype.

Differential diagnosis. This species could be distinguished from all others of *Ichthyurus* by combination of the following characters in the shape of terminal abdominal ventrite in male (Fig. 21C) and female (Fig. 21D), as well as the structure of aedeagus (Fig. 21A–D), particularly in the characteristic proctiger and paraproct (Fig. 21E, F).

Description. Body length (both sexes): 10.7–11.2 mm (11.2 mm in holotype); body width (both sexes): 1.7–1.9 mm (1.9 mm in holotype).

Male (Fig. 20A). Colouration. Body black, prosternum yellow, pronotum yellow at posterior angles, scutellum yellow, elytra narrowly yellow along basal part of suture, legs yellow at basal 2/3 parts of femora, abdomen yellow posteriorly and laterally.

Eyes moderately protruding, interocular distance ca. 0.6 times of the diameter of an eye. Antennomere II ca. 1/3 length of I, III–VI subequal in length and ca. 3.0 times longer than II.

Pronotum 1.1 times wider than long, anterior margin arcuate, lateral margins nearly feebly diverging posteriorly, posterior margin slightly bisinuate, anterior angles confluent with anterior margin, posterior angles nearly rectangular.

Elytra 1.4 times longer than wide, ca. 2.1 times longer than pronotum, with lateral margins slightly sinuate, sutural margins sinuate and moderately dehiscent from the basal 1/3 part, distance between sutural margins twice as wide as apical width of an elytron, apices rounded.

Pro- and metathoracic legs slender and simple (Fig. 20A); mesotrochanter (Fig. 20A) with an inconspicuous apical tooth, mesofemora weakly swollen.

Terminal abdominal tergite (Fig. 21A) ca. 1.5 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite, moderately arcuate at inner margins and slightly arcuate at outer margins. Proctiger (Fig. 21E, F) bilobed and strongly sclerotised, with outer apical angles rounded and inner apical angles protruding and acute, completely surrounded by paraproct; paraproct (Fig. 21E, F) strongly developed, hexagonal, with lateral margins bordered and extending dorsally into a longitudinal ridge in middle, with a short and conical protrusion in middle of posterior margin, tergal flange weakly sclerotised, expanded at base and narrowly protruding apically.

Terminal abdominal ventrite (Fig. 21C) trilobed, approximately twice as wide as long, fissured in middle of apical half part, with lateral lobes generally axe-like, nearly straight at both inner and outer margins, inner apical angles moderately projecting and rounded at apices, outer apical strongly projecting and acute at apices.

Abdominal sternite IX (Fig. 8H) moderately sclerotised and subparallel-sided, ca. 1.8 times longer than wide, with posterior margin shallowly emarginate, posterior right and left angles nearly rectangular, anterior left angle small beak-shaped and right angle strongly protruding anteriorly.

Aedeagus (Fig. 22A–D): right paramere spine-like, ca. 3.0 times as long as wide (Fig. 22A, D); left paramere nearly straight and cylindrical, rounded at apex, 3.0 times longer than right paramere (Fig. 22A–D); setifore extension reduced and almost invisible (Fig. 22B); median lobe ca. 1.5 times as long as tegmen, even in width along whole length (Fig. 22A, D).

Female (Fig. 20B). Similar to males, but body larger, eyes less protruding, elytra uniformly black, legs yellow at basal 1/3 parts of femora; terminal abdominal tergite (Fig. 21B) ca. 1.1 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite; terminal abdominal ventrite (Fig. 21D) nearly as long as wide, widest near middle, triangular at latero-apical angles, arcuate at lateral margins, widely and roundly emarginate in middle of posterior margin.

Etymology. The specific name is derived from the Latin word "*simplus*" (simple), referring to its simple aedeagus.

Distribution. China (Guangxi).

Remarks. Antennomeres VII–XI of the holotype and V–XI of the paratype are missing.

Ichthyurus senensomimus Y. Yang, Lin & X. Yang, sp. nov.

https://zoobank.org/2F8EFA8E-701E-4FAF-8070-8464D9343FFE

Figs 6H–I, 8I, 10F, 20C–D, 22E–H, 23

Type material. ***Holotype.*** China. Yunnan • ♂ (IZAS), Yongsheng, Liude, 2240 m alt., 18.VII.1984, Shuyong Wang leg.

Paratypes. China. Yunnan • 1♂1♀ (IZAS), same locality as holotype, 2230 m alt., 8.VII.1984, Jianguo Fan leg.

Differential diagnosis. This species could be distinguished from all others of *Ichthyurus* by combination of the following characters: body colouration (Fig. 20C, D), moderately swollen profemora in male (Fig. 6H), shape of terminal abdominal ventrite of male (Fig. 23C) and female (Fig. 23D), as well as aedeagus (Fig. 22E–H).

This species looks similar to *I. senensis* in the body coloration (Fig. 20C, D vs. Fig. 1A, B), but differs in the shapes of terminal abdominal ventrite of male (Fig. 2E vs. Fig. 23C) and female (Fig. 2F vs. Fig. 23D), as well as aedeagus (Fig. 3A–D vs. Fig. 22E–H). Additionally, it resembles *I. longulus* Y. Yang, Lin & Liu, 2024 in the general shapes of terminal abdominal ventrites of both male (Fig. 23C vs. Lin et al. (2024b): fig. 2D) and female (Fig. 23D vs. Lin et al. (2024b): fig. 2F), but it can be distinguished from the latter in the bicoloured elytra, mixed black with yellow (Fig. 20C, D) (elytra uniformly black in *I. longulus*;

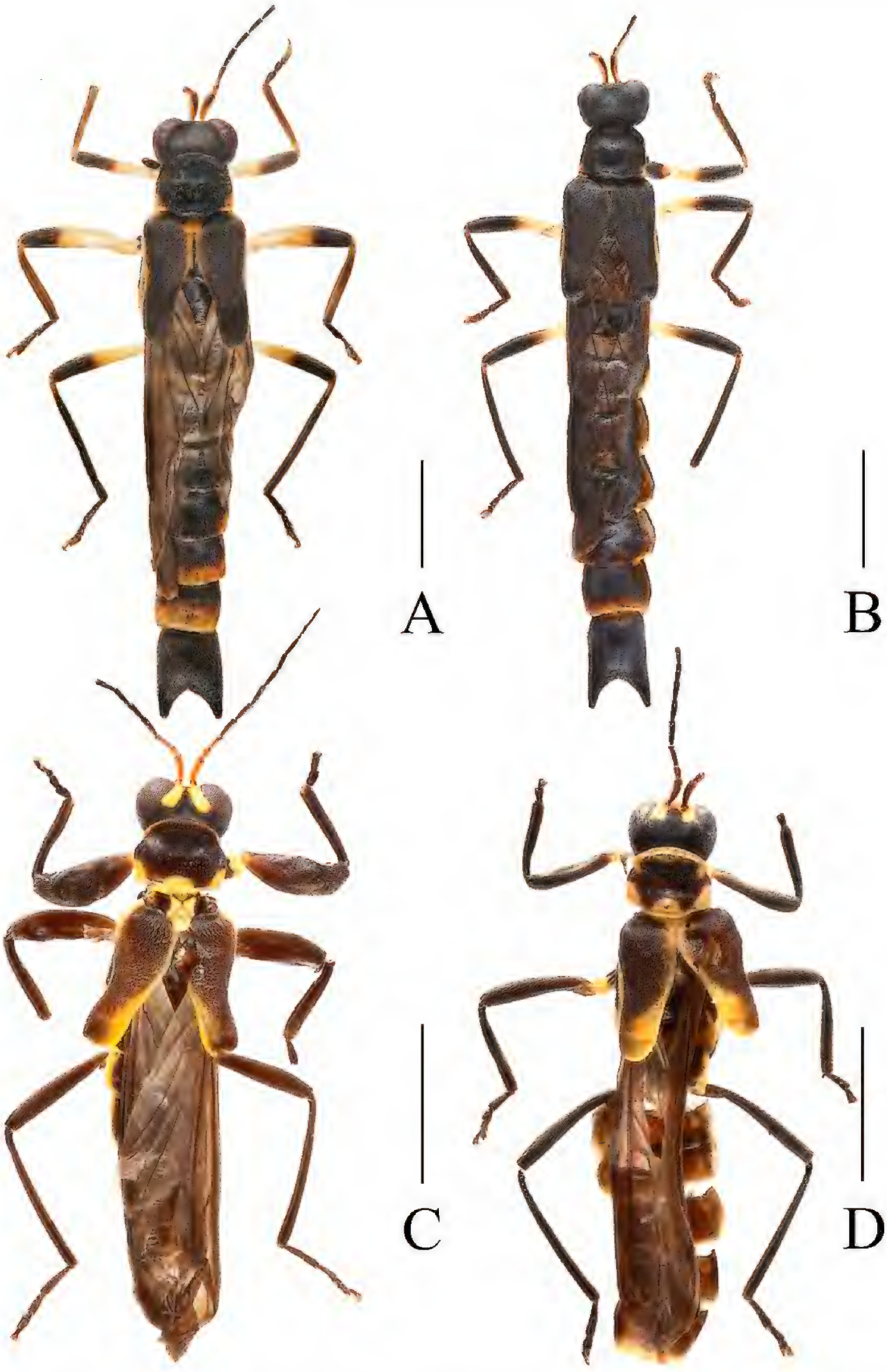

Figure 20. Habitus of *Ichthyurus* species, dorsal view: **A, B.** *I. simplus* sp. nov.; **C, D.** *I. senensomimus* sp. nov.; **A, C.** Males; **B, D.** Females. Scale bars: 2.0 mm.

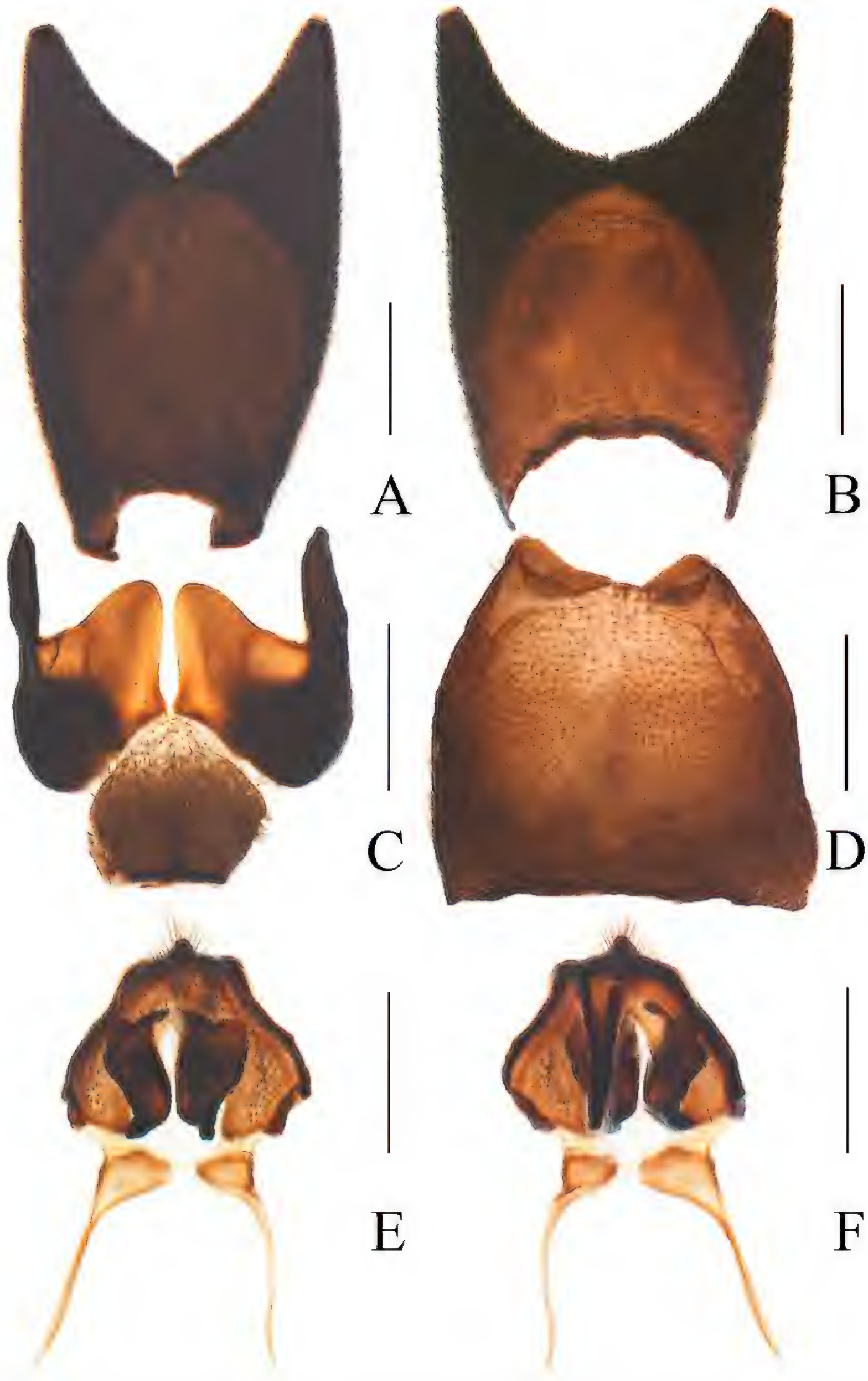

Figure 21. Genital segments of *I. simplus* sp. nov.: **A, B.** Terminal abdominal tergite, ventral view; **C, D.** Terminal abdominal ventrite, ventral view; **E.** Proctiger and paraproct, ventral view; **F.** Proctiger and paraproct, dorsal view; **A, C, E, F.** Males; **B, D.** Females. Scale bars: 0.5 mm.

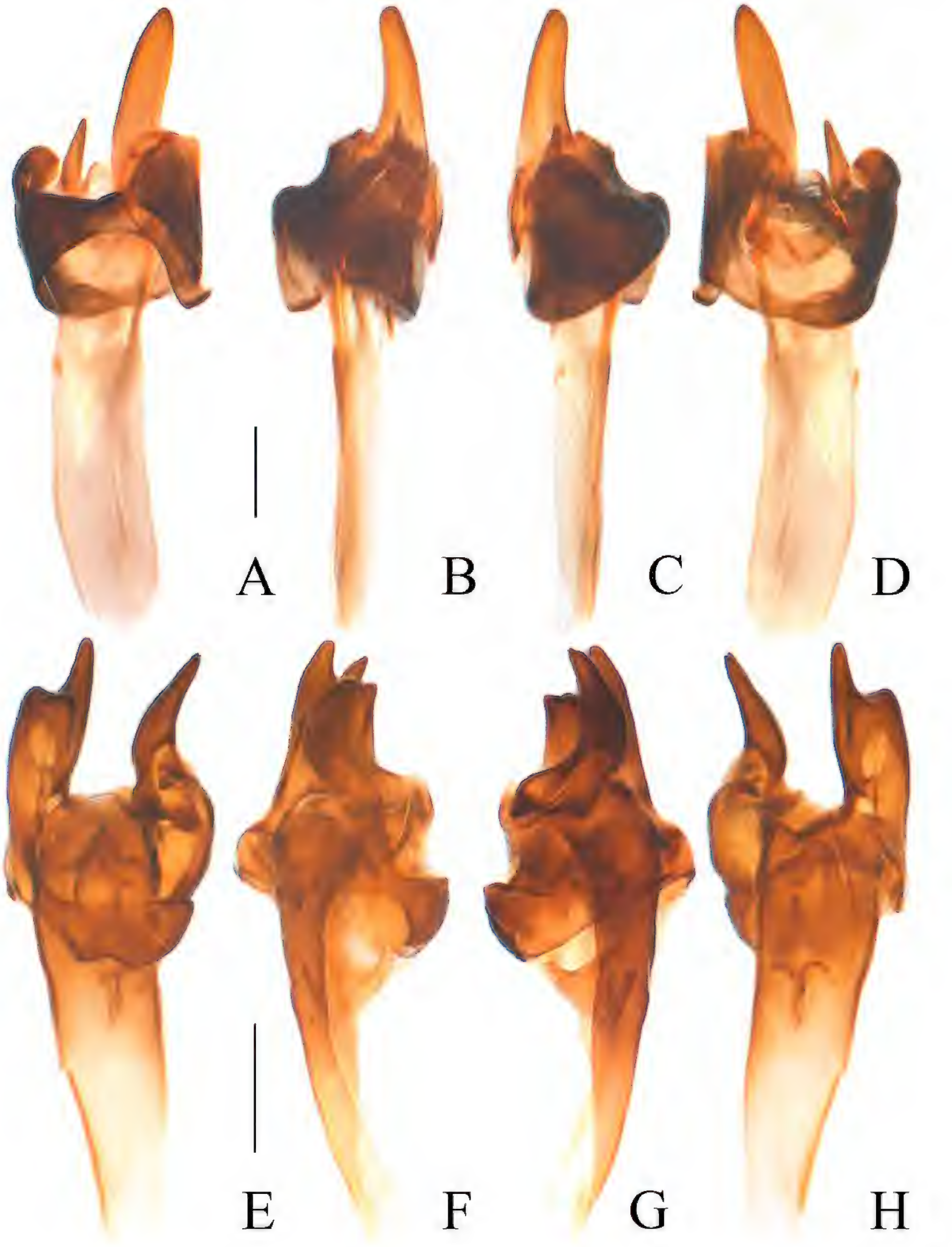

Figure 22. Aedeagi of *Ichthyurus* species: **A–D.** *I. simplus* sp. nov. **E–H.** *I. senensomimus* sp. nov. **A, E.** Dorsal views; **B, F.** Left-lateral views; **C, G.** Right-lateral views; **D, H.** Ventral views. Scale bars: 0.2 mm.

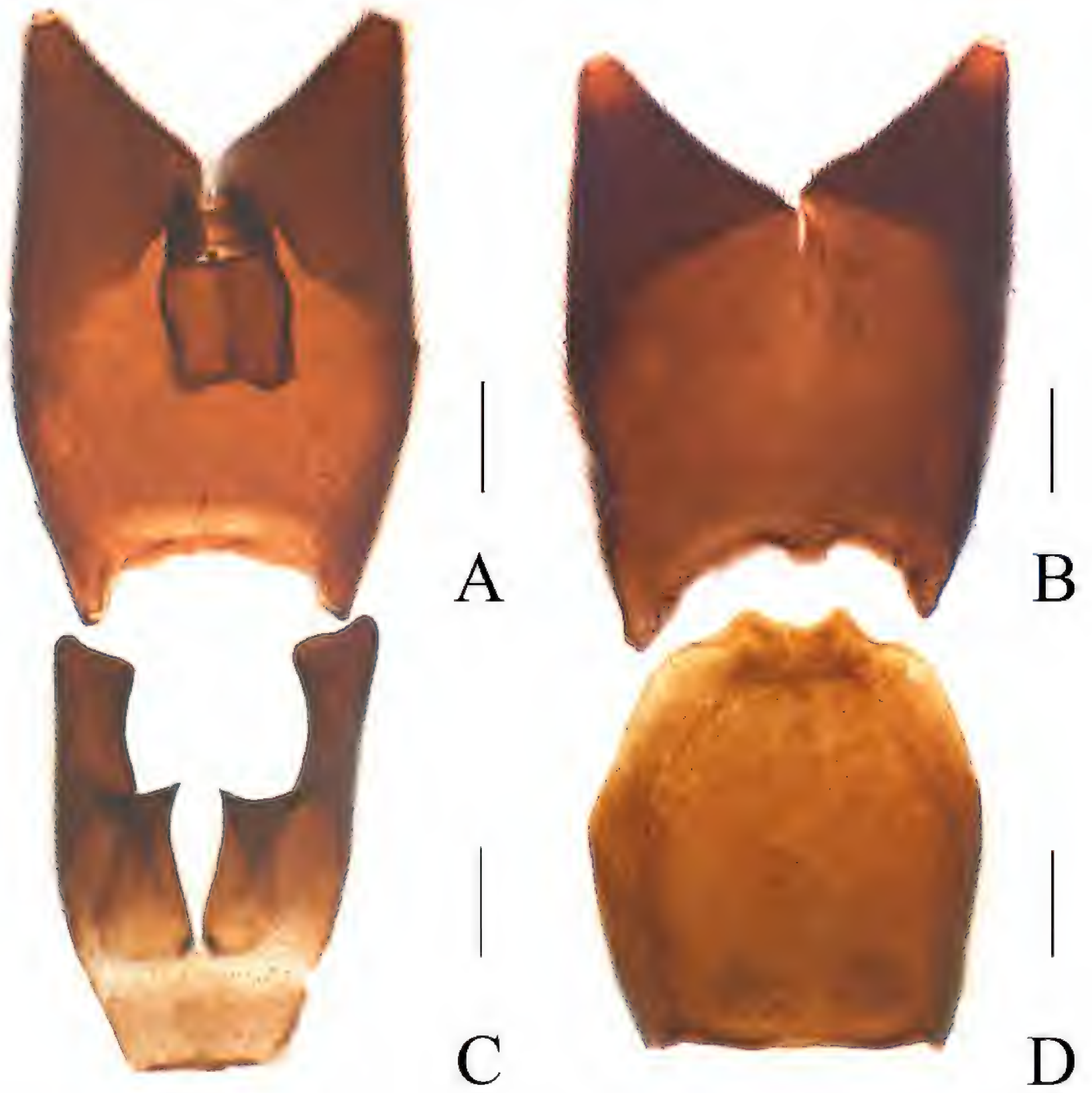

Figure 23. Genital segments of *I. senensomimus* sp. nov.: **A, B.** Terminal abdominal tergites, ventral view; **C, D.** Terminal abdominal ventrites, ventral view; **A, C.** Males; **B, D.** Females. Scale bars: 0.5 mm.

Lin et al. (2024b): fig. 1); profemora moderately swollen in male (Fig. 20C) (slender in *I. longulus*; Lin et al. (2024b): fig. 1); terminal abdominal ventrites of both sexes with stouter and shorter postero-lateral projections (Fig. 21A, B) (very slender and long in *I. longulus*; Lin et al. (2024b): fig. 2A–C); aedeagus: setifore extension reduced and invisible (Fig. 22F) (well-developed and as long as parameres in *I. longulus*; Lin et al. (2024b): fig. 3).

Description. Body length (both sexes): 7.3–7.7 mm (7.3 mm in holotype); body width (both sexes): 1.5 mm (1.5 mm in holotype).

Male (Fig. 20C). Colouration. Body black, head yellow before antennal sockets, antennomeres I–III yellow, prosternum yellow, pronotum yellow with a large black marking extending to all margins, except for yellow at posterior angles and middle semicircular regions near to posterior margin, scutellum yellow, elytra yellow along suture, the yellow stripe wider near apices, abdomen yellow posteriorly and laterally.

Eyes strongly protruding, interocular distance ca. 0.6 times of the diameter of an eye. Antennae extending to elytral apex, antennomere II ca. 1/3 length of I, III–XI subequal in length and ca. 1.5 times longer than II.

Pronotum 1.3 times wider than long, anterior margin arcuate, lateraly margins arcuate, posterior margin slightly bisinuate, anterior angles feebly emarginate, posterior angles nearly rectangular.

Elytra 1.4 times longer than wide, approximately twice longer than pronotum, with lateral margins slightly sinuate, sutural margins sinuate and moderately dehiscent from the base, distance between sutural margins twice as wide as apical width of an elytron, apices rounded.

Profemora (Fig. 6H) strongly swollen, fluent ventrally, without any tooth, 2.4 times longer than wide; mesotrochanter (Fig. 6I) with an acute apical tooth, mesofemora (Fig. 6I) moderately swollen, fluent ventrally, without any tooth; metathoracic legs slender and simple (Fig. 20C).

Terminal abdominal tergite (Fig. 23A) ca. 1.5 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite, nearly straight at inner margins, moderately arcuate at outer margins. Proctiger (Fig. 23A) bilobed and laterally sclerotised, semi-surrounded by paraproct; paraproct (Fig. 23A) strongly developed and tubular, feebly shrunk apically, rounded at dorso-posterior margin, tergal flange (destroyed and missing).

Terminal abdominal ventrite (Fig. 23C) trilobed, ca. 1.4 times as long as wide, fissured in middle of apical 4/5 part, with lateral lobes diverging posteriorly and rectangularly protuberant in middle of inner margins, the protuberances very acute at apices, arcuate at outer margins, rectangular at inner apical angles, narrowly rounded and feebly projecting at outer apical angles, truncate at posterior margins.

Abdominal sternite IX (Fig. 8I) moderately sclerotised and narrowed posteriorly, ca. 2.4 times longer than wide, with posterior margin obliquely truncate and confluent with posterior left angle, posterior right angle rectangular, anterior left angle stout beak-shaped and right angle strongly protruding anteriorly, moderately expanded and triangular at apex.

Aedeagus (Fig. 22E–H): right paramere stout, abruptly stepped near apical 1/4 part of outer side, acute at apex (Fig. 22 E–H); left paramere bent near base and horn-shaped, acute at apex, nearly as long as right paramere (Fig. 22E, H); setifore extension reduced and almost invisible (Fig. 22F); median lobe ca. 1.5 times as long as tegmen, progressively narrowed basally (Fig. 22E, H).

Female (Fig. 20D). Similar to males, but body larger and longer, eyes less protruding, pro- and meso-thoracic legs slender and simple, antennomeres I–III black, pronotum with black marking not extending to anterior margin and anterior angles; terminal abdominal tergite (Fig. 23B) ca. 1.1 times longer than wide, with postero-lateral projections ca. 1/3 length of the tergite; terminal abdominal ventrite (Fig. 23D) ca. 1.1 times as long as wide, widest near middle, rounded at lateral margins and confluent with outer apical angles, with a pair of small and triangular protuberances on both sides of posterior margin. Internal organ of the reproductive system (Fig. 10F): bursa copulatrix elongate tube-shaped at apex; accessory gland expanded at apical half part.

Etymology. The specific name is derived from the Latin word *-mimus* (imitate), refers to its similarity to *I. senensis*.

Distribution. China (Yunnan).

A checklist of *Ichthyurus* species from China's mainland

Ichthyurus bilineatimimus Y. Yang, Liu & X. Yang, 2024

Ichthyurus bilineatimimus Y. Yang, Liu & X. Yang, *in*: Lin et al. (2024a: 205), figs 5D, 5F, 13B, 14B, D, 15E–H.

Distribution. China (Yunnan).

Ichthyurus bisignatus Pic, 1926

Ichthyurus bisignatus Pic, 1926: 5.

Distribution. China (new record: Yunnan), Vietnam.

Ichthyurus bourgeoisi Gestro, 1892

Ichthyurus bourgeoisi Gestro, 1892: 1023; Lin et al. (2024a: 195), figs 5B, 7B, 9A, B, 10A, C, E, 11A–D, 12A, B.

Distribution. China (Shaanxi, Anhui, Zhejiang, Hubei, Jiangxi, Hunan, Fujian, Guangdong, Guangxi, Chongqing, Sichuan, Guizhou).

Ichthyurus cleriformis Y. Yang, Lin & Liu, sp. nov.

Distribution. China (Yunnan), Laos.

Ichthyurus davidi Gestro, 1892

Ichthyurus davidi Gestro, 1892: 1038, fig.

Distribution. China (Jiangxi, Anhui, Fujian, Guangxi, Guangdong).

Ichthyurus feae Gestro, 1891

Ichthyurus feae Gestro, 1891: 564; (1892: 1040); (1922: 100); Pic (1923b: 45); Brancucci (2009: 319); Lin et al. (2025: 6), figs 2, 3A, 4–6, 7A.
Ichthyurus laosensis Li et al. (2014: 182), figs 1–3. Synonymised by Lin et al. (2025: 6).
Ichthyurus lii Lin et al. 2025: 6. Replacement name for *I. laosensis* Li et al. 2014, preoccupied by Pic (1916: 13).

Distribution. China (Yunnan, Xizang), Laos, Thailand, northern India, Myanmar, Nepal.

Ichthyurus gracilicauda Y. Yang, Liu & X. Yang, 2025

Ichthyurus gracilicauda Y. Yang, Liu & X. Yang, in: Lin et al. (2025: 9), figs 3C, 7C, 8C, D, 9B, 10B, D, F, H, 11E–H, 12B, D.

Distribution. China (Yunnan).

Ichthyurus hainanensis Y. Yang, Lin & Liu, 2025

Ichthyurus hainanensis Y. Yang, Lin & Liu, *in*: Lin et al. (2025: 15), figs 3E, 13C, D, 14C, D, 15B, D, F, 16E–H, 17B, D, 18B.

Distribution. China (Hainan).

***Ichthyurus laniger* Gestro, 1891**

Ichthyurus laniger Gestro, 1891: 581, fig. 42; 1906b: 272, fig. 15.

Distribution. China (new record: Yunnan), Myanmar.

***Ichthyurus longulus* Y. Yang, Lin & Liu, 2024**

Ichthyurus longulus Y. Yang, Lin & Liu, *in*: Lin et al. (2024b: 3), figs 1–5.

Distribution. China (Chongqing, Shaanxi, Gansu, Hubei, Guangxi, Guizhou).

***Ichthyurus multidentatus* Y. Yang, Liu & X. Yang, 2025**

Ichthyurus multidentatus Y. Yang, Liu & X. Yang, *in*: Lin et al. (2025: 12), figs 3D, 13A–B, 14A–B, 15A, 15C, 15E, 16A–D, 17A, 17C, 18A.

Distribution. China (Guangxi).

***Ichthyurus opacus* Gestro, 1906**

Ichthyurus opacus Gestro, 1906a: 236; 1906b: 290; Pic (1923b: 45); Lin et al. (2024a: 192), figs 2C, 3B, 4E, F, 6E–H.

Distribution. China (Yunnan), Vietnam.

***Ichthyurus phungi* Pic, 1923**

Ichthyurus phungi Pic, 1923a: 3.

Distribution. China (new record: Zhejiang), Vietnam (Tonkin).

***Ichthyurus pieli* Pic, 1924**

Ichthyurus pieli Pic, 1924: 89.

Distribution. China (Shanghai).

***Ichthyurus platyurus* Gestro, 1906**

Ichthyurus platyurus Gestro, 1906b: 295, figs 18–20.

Distribution. China (new record: Yunnan), Myanmar.

***Ichthyurus salvazai* Pic, 1943**

Ichthyurus salvazai Pic, 1943: 1; Lin et al. (2025: 8), figs 3B, 7B, 8A, B, 9C, 10A, C, E, G, 11A–D, 12A, C.
Ichthyurus bernardi Li & Gao, 2015: 193, fig. 1a, b. Synonymised by Lin et al. (2025: 8).

Distribution. China (Yunnan), Laos.

***Ichthyurus savioi* Pic, 1928**

Ichthyurus savioi Pic, 1928: 14; Lin et al. (2024a: 201), figs 5C, 5E, 7C, 9C, D, 10B, 10D, 10F, 11E–H, 12C, D.

Distribution. China (Anhui, Henan, Hubei, Zhejiang, Jiangxi, Fujian).

***Ichthyurus senensis* Pic, 1926**

Ichthyurus senensis Pic, 1926: 5.

Distribution. China (Yunnan).

***Ichthyurus senensomimus* Y. Yang, Lin & X. Yang, sp. nov.**

Distribution. China (Yunnan).

***Ichthyurus simplus* Y. Yang, Lin & Liu, sp. nov.**

Distribution. China (Guangxi).

***Ichthyurus terminalis* Y. Yang, Lin & X. Yang, sp. nov.**

Distribution. China (Yunnan).

***Ichthyurus vandepolli* Gestro, 1892**

Ichthyurus vandepolli Gestro, 1892: 1029, 1030; 1906b: 283; Lin et al. (2024a: 186), figs 2A, B, 3A, 4A–D, 5A, 6A–D, 7A.

Distribution. China (Jiangsu, Anhui, Zhejiang, Hunan, Fujian, Guangdong, Guangxi).

A key of the *Ichthyurus* species from China's mainland

1 Head mostly yellow, with a black marking on vertex (e.g. Figs 5, 12) 2
– Head uniformly or mostly black, at most yellow before antennal sockets (e.g. Figs 1, 16, 20; Lin et al. (2024a): figs 2, 9, 13; (2024b): fig. 1; (2025): figs 2, 8, 13) 5
2 Mesotrochanters strongly protruding apically, meso-femora and tibiae with a pair of large teeth opposite to each other ventrally in male (Fig. 6A); terminal abdominal tergite strongly flattened in male (Fig. 7A, C) ... *I. platyurus* Gestro, 1906
– Mesotrochanters never protruding apically, meso-femora and tibiae without any or opposite teeth in male (Fig. 6D–F); terminal abdominal tergite never flattened in male (e.g. Figs 11A, C, 13A, C, 15A, C) 3

3 Protibiae emarginate near apices (Fig. 6B), mesotibiae strongly expanded at base (Fig. 6D), meta-tibiae and tarsomeres I densely covered with long hairs (Fig. 6C), all tarsomeres I lengthened in male (Fig. 6B–D)..... *I. laniger* Gestro, 1891
– All legs simple, never emarginate or without any long hairs, at most mesofemora feebly swollen in male (e.g. Fig. 12A, C)...4
4 Elytra with a pair of black rounded markings near to sutural margins at basal parts, black margins extending behind humeri to apices (Fig. 12A, B); terminal abdominal ventrite of male with lateral lobes longitudinally and sinuately ridged near inner margins (Fig. 13E) ..... *I. bisignatus* Pic, 1926
– Elytra without any black markings near to sutural margins, black margins extending from humeri, but not reaching apices (Fig. 12C, D); terminal abdominal ventrite of male unlike above, with lateral lobes bidentated at inner margins (Fig. 15E) ..... *I. phungi* Pic, 1923
5 Mesofemora strongly swollen in male, with at least one denticle ventrally (e.g. Lin et al. (2025): fig. 3); terminal abdominal ventrite of male strongly reduced and mostly hidden beneath penultimate abdominal ventrite, almost invisible in natural state (e.g. Lin et al. (2025): figs 4A, C, 9A, B, 10C–F, 14A, C, 15C, D) (*I. feae* species group)..... 6
– Mesofemora feebly or moderately swollen in male, without any denticles ventrally (e.g. Figs 1A, C, 2B, 4A, 6G, I, 16A, C, 20A, C; Lin et al. (2024a): figs 2A, C, 9A, C, 13B; (2024b): fig. 1); terminal abdominal ventrite of male well developed and visible in natural state (e.g. Figs 2E, 4B, E, 17C, 19A, E 21C, 23C; Lin et al. (2024a): figs 4B, F, 10A, B, E, F, 14D; (2024b): fig. 2A) 10
6 Elytra black, yellow at bases (Lin et al. 2025: fig. 2A, B) ..... *I. feae* Gestro, 1891
– Elytra black, with an X-shaped yellow marking extending along bases and suture, or yellow, each elytron with a black marking behind humerus and at apex respectively (e.g. Lin et al. (2025): figs 8A–D, 13A–D)..... 7
7 Mesofemora with one denticle ventrally, tibiae simple in male (Lin et al. (2025): figs 3E, 13C)..... ..... *I. hainanensis* Y. Yang, Liu & X. Yang, 2025
– Mesofemora with several denticles ventrally, tibiae dilated apically in male (e.g. Lin et al. (2025): figs 3B–D, 8A, C, 13A) 8
8 Terminal abdominal ventrite of male with lateral portions dorso-ventrally expanded, nearly triangular in apical view (e.g. Lin et al. (2025): figs 9A, B, 10C–F)..... 9
– Terminal abdominal ventrite of male on the same plane, with lateral portions never dorso-ventrally expanded or invisible in apical view (Lin et al. (2025): figs 14A, 15C)..... *I. multidentatus* Y. Yang, Liu & X. Yang, 2025
9 Terminal abdominal tergite of male very slender, 3.0 times longer than wide, with postero-lateral projections 2/3 length of the tergite (Lin et al. (2025): figs 9B, 10B) ..... *I. gracilicauda* Y. Yang, Liu & X. Yang, 2025
– Terminal abdominal tergite of male less slender, 1.5 times longer than wide, with postero-lateral projections half length of the tergite (Lin et al. (2025): figs 9A, 10A) ..... *I. salvazai* Pic, 1943
10 Antennomere III thickened in male (e.g. Lin et al. (2024a): fig. 2A, C); pronotum feebly longer than wide or subequal (e.g. Lin et al. (2024a): fig. 2A, C); protibiae dilated apically, each with a spine at apex, tarsomeres I projecting distally to the ventral part of II in male (e.g. Lin et al. (2024a): figs 2A, C, 3A, B) (*I. vandepolli* species group)..... 11
– Antennomere III simple and slender in male (e.g. Figs 1A, C, 16A, C, 20A, C; Lin et al. (2024a): figs 9A, C, 13B); pronotum wider than long (e.g. Figs 1A, C, 16A, C, 20A, C; Lin et al. (2024a): figs 9A, C, 13B); protibiae and tarsomere I simple in male (e.g. Figs 1A, C, 2A, 16A, C, 20A, C; Lin et al. (2024a): figs 9A, C, 13B)..... 12
11 Protibiae dilated along whole length, with outer apical angles acute in male (Lin et al. (2024a): figs 2A, 3A) .... *I. vandepolli* Gestro, 1892
– Protibiae dilated along basal 3/4 part and abruptly constricted at apical 1/4, forming a triangular angle at subapical part (Lin et al. (2024a): figs 2B, 3B)..... *I. opacus* Gestro, 1906
12 Terminal abdominal tergite of male with postero-lateral projections excavated ventrally and arcuately, often delimitated with edges, which are keeled and hooked terminally (e.g. Fig. 19A, C; Lin et al. (2024a): figs 10A–D, 14B) (*I. bourgeoisi* species group) 13
– Terminal abdominal tergite of male with simple postero-lateral projections, never excavated ventrally or ridged and hooked (e.g. Figs 2C, 4B, C, 17A, 21A, 23A)..... 16
13 Head and pronotum uniformly black, elytra yellowishorange, with a pair of black rounded markings in middle of disc (Fig. 16C, D) ..... *I. cleriformis* sp. nov.
– Head and or pronotum bicolored, elytra unlike above, mostly black or yellow with black stripes (Lin et al. (2024a): figs 9, 13B) 14
14 Elytra black at apices (Lin et al. (2024a): fig. 13B); paraproct with a pair of large and horn-shaped projections and another pair of small triangular projections at lateral margins (Lin et al. (2024a): fig. 5F)..... ..... *I. bilineatimimus* Y. Yang, Liu & X. Yang, 2024
– Elytra yellow or mixed with black at apices (e.g. Lin et al. (2024a): fig. 9A–D); paraproct only with a pair of inconspicuous projections at lateral margins (e.g. Lin et al. (2024a): figs 5E, 10A, C) 15
15 Elytra black at humeri and apices (Lin et al. (2024a): fig. 9A, B), terminal abdominal tergite bicolored, mixed yellow with black (Lin et al. (2024a): figs 10A, C, 12A, B) ..... *I. bourgeoisi* Gestro, 1906
– Elytra yellow at humeri and apices (Lin et al. (2024a): fig. 9C, D); terminal abdominal tergite uniformly black (Lin et al. (2024a): figs 10B, D, 12C, D) ..... *I. savioi* Pic, 1928

16 Mesofemora moderately or strongly swollen in male (e.g. Figs 1A, C, 2B, 4A, 6I, 20C) 17
– Mesofemora slender or weakly swollen in male (e.g. Figs 6G, 16A, 20A; Lin et al. (2024b): fig. 1A) 19
17 Elytra yellow at bases and apices, pronotum with the black marking not extending to anterior margin (Fig. 1C, D); profemora slender in male (Fig. 1C) ..... *I. davidi* Gestro, 1892
– Elytra black at bases, mixed black with yellow at apices, pronotum with the black marking extending to anterior margin (e.g. Figs 1A, B, 20C, D); profemora moderately swollen in male (e.g. Figs 1A, 2A, 6H, 20C) 18
18 Terminal abdominal ventrite of male transverse, obviously wider than long (Fig. 2E); terminal abdominal ventrite of female nearly straight at posterior margin (Fig. 2F); aedeagus (Fig. 3A–D): left paramere distinctly longer than right paramere, setifore extension well-developed ..... *I. senensis* Pic, 1926
– Terminal abdominal ventrite of male elongate, much longer than wide (Fig. 23C); terminal abdominal ventrite of female with a pair of teeth at posterior margin (Fig. 23D); aedeagus (Fig. 22E–H): left and right parameres subequal in length, setifore extension reduced and invisible ..... *I. senensomimus* sp. nov.
19 Elytra uniformly black (Lin et al. (2024b): fig. 1A); protibia with a process at apex in male (Lin et al. (2024b): fig. 1A); aedeagus: setifore extension well-developed, as long as parameres (Lin et al. (2024b): fig. 3) ..... *I. longulus* Y. Yang, Lin & Liu, 2024
– Elytra bicoloured, mixed black with yellow; protibia without any process at apex in male (e.g. Figs 16A, B, 20A, B); aedeagus: setifore extension reduced and almost invisible or well-developed, but much shorter than parameres (Figs 18B, C, 22A, D) 20
20 Head bicoloured, mostly black, yellow before antennal sockets, pronotum yellow at anterior angles (Fig. 16A, B); terminal abdominal ventrite of male peltate (Fig. 17C); terminate abdominal ventrite of female nearly straight at posterior margin (Fig. 17D) ..... *I. terminalis* sp. nov.
– Head uniformly black, pronotum black at anterior angles (Fig. 20A, B); terminate abdominal ventrite of male trilobed (Fig. 21C); terminate abdominal ventrite of female widely and roundly emarginate in middle of posterior margin (Fig. 21D) ..... *I. simplus* sp. nov.

Notes. No types or any determined specimens of *I. pieli* are available to us and its morphological information provided in the original description (Pic 1924) is also limited, so this species cannot be included in the key.

Discussion

Ichthyurus is a large genus and warrants subdivisions to facilitate its taxonomy. In our preceding studies, we have established three species groups (Lin et al. 2024a, 2025), each comprising at least two species. The species groups are defined, based on a combination of morphological characters in the shapes of antennae, legs, terminal abdominal tergites and ventrites in males, terminal abdominal ventrites in females, as well as the structures of the aedeagus. Within each group, species tend to exhibit consistent body colouration patterns, but some species may be distinctive. For instance, *I. feae* in the *I. feae* species group (Lin et al. 2025) exemplifies this distinction, as does *I. cleriformis* sp. nov., which is herein attributed to the *I. bourgeoisi* species group. However, body colouration cannot serve as a reliable criterion for attributing species identidy. For example, although *I. senensis* and *I. senensomimus* sp. nov. display comparable body colouration (Figs 1A, B, 20C, D), they show no similarity in their terminal abdominal tergites and ventrites of males or females (Fig. 2C–F vs. Fig. 23) or aedeagus (Fig. 3A–D vs. Fig. 22E–H). Another illustrative case involves *I. platyurus*, *I. laniger*, *I. bisignatus* and *I. phungi*. While these species share similar body colouration (Figs 5, 12), each is distinctly characterised by unique features such as the terminal abdominal tergite of male (Fig. 7A, C) in *I. platyurus*, legs of male (Fig. 6A–D) in *I. platyurus* and *I. laniger* or aedeagus structures (Figs 9, 14). Certainly, some species are truly unparalleled when compared to others. For example, *I. terminalis* sp. nov. is particularly distinctive in terms of its abdominal sternite VIII and IX of male (Fig. 17C, F), proctiger and paraproct (Fig. 17E), as well as aedeagus (Fig. 18A–D), while *I. simplus* sp. nov. stands out due to its characteristic proctiger and paraproct (Fig. 21E, F). Consequently, for the species of *Ichthyurus* from China's mainland, only two are classified within the *I. vandepolli* species group (Lin et al. 2024a), four belong to the *I. bourgeoisi* species group (including *I. cleriformis* sp. nov.) (Lin et al. 2024a) and five are part of the *I. feae* species group (Lin et al. 2025), while the remaining ones could not be assigned to any group at the moment. Nevertheless, with the discovery of an increasing number of species, it is expected that analogous ones will emerge in the near future, thereby enabling the classification of Chinese species into specific species groups.

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Conceptualisation: WWZ, HQL, HYL, XKY, YXY. Data curation: WWZ, HQL, YXY. Formal analysis: WWZ, HQL, YXY. Funding acquisition: YXY. Investigation: WWZ, HQL, HYL, YXY. Methodology: WWZ, HQL. Project administration: YXY. Resources: XKY, YXY. Software: WWZ, HQL. Supervision: YXY, HYL, XKY. Visualisation: WWZ, HQL. Writing – original draft: WWZ, HQL, HYL. Writing – review and editing: XKY, YXY.

Data availability

All of the data that support the findings of this study are available in the main text.

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